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Management takes the Strain

THE intensification of the war effort coupled with the more regular and widespread enemy air attacks on important British centres has thrown an added strain on those directly responsible for the management of works of all kinds related to the armament industries. How well they have taken the strain will probably never be known in any detail, for the efficiency of these departments is such that it is the rare breakdown and not the constant success in overcoming difficulties as they arise that arouses comment or becomes known. In times such as the present and the recent past it becomes necessary to subordinate all other considerations to the primary objective of getting the job done—and that is at once the function and the pride of the works management. Possibly because it is more apparent to most of us, the excellent work the railways have done in maintaining movement on the lines in the face of all difficulties, and the brevity of such interruptions as have occurred, have received some notice, although it is difficult to envisage the herculean efforts which must have been put forth to achieve these results. Similar problems have had to be met in widely divergent kinds of works. In every works today there is another task to be achieved—that of securing the full co-operation of the labour force so that output may be increased steadily to its maximum. The handling of labour so as to ensure a wartime peak of output is a highly skilled matter, and the desired end is to be achieved only by enlisting the enthusiastic support of the workers.

* * * *

Wise Use of Compulsory Powers

There can be little doubt that it is appreciation by the Government of the fact that optimum results are to be obtained only from an industrial endeavour which springs from willing acceptance of the need to put forward great efforts to meet the national peril, which has caused it to leave its wide compulsory powers in abeyance. In taking these powers, which virtually gave it control of all persons and industry if the need should arise, it armed itself with a weapon which many feared might be used with greater freedom than wisdom. Events so far have shown that the Government does not intend to be precipitate in its application of compulsion on either workmen or employers. It would appear that it is alive to the fact that the work of a driven people can never compare with that of one which gives freely of its best in a cause it is willing to support. The results which have been achieved in the stepping up of output and deliveries of essential products in recent weeks, notwithstanding the added strain which has been placed on both workers and employers by enemy visitations, is a tribute to the system long established in this country. The British do not take kindly to regimentation and compulsion—which seem to make a greater appeal or to be better borne by some of their Continental neighbours—and a continuance of the present Government policy of restraint in bringing pressure to bear on industry will no doubt yield better results than would any attempt to force the pace by the use of compulsory powers. The remarkable manner in which industry has responded to the call for ever mounting output and the uncomplaining way in which employers have faced the demands made on their works for wartime services at little return, and workers have met the calls made on their energies and amenities demonstrates how unnecessary is compulsion.

* * * *

Woolwich to Westminster by Steamer

The introduction of a ferry service on the Thames between Westminster and Woolwich is a praiseworthy attempt to improvise transport between two points of some importance in present circumstances. Londoners have accorded the service an enthusiastic reception, probably because the use of the river appeals to the imagination and also because of the novelty to the present generation of water travel. Those

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who, like Mr. A. P. Herbert, have campaigned so vigorously for water-buses may find some consolation for the maltreatment of our language in the fruition of another ambition. Useful adjunct to land transport services though the steamers may prove in present circumstances, it cannot be claimed that they are a fully economic and efficient permanent addition to the travel amenities of the City. At present there are very stringent limitations to the usefulness of the service, not the least of which is the period between vessels and the early hour at which the last boat leaves Westminster. Logical extension of the system now in its initial stages would involve very heavy expenditure, and it is probable that the experiment will prove but a temporary measure designed to meet transient difficulties. With the approach of colder weather, and the fogs for which the Thames is renowned, passengers will have an opportunity to judge for themselves some of the more apparent disadvantages of river travel. The service may, however, be most useful in the provision of information and experience on a subject which has aroused so much controversy that practical demonstration of its appeal and limitations is welcome.

* * * *

Expediting Travel in Air Raids

A railway custom of earlier days, before the corridor train had made possible the work of the travelling ticket collector, was the stopping of incoming express trains at some suitable station or junction in the London suburbs for the collection of tickets. These stops, although of course increasing the journey time of the trains concerned, had the advantage of enabling passengers living in or travelling to suburban stations on those lines to avoid going into and out of the terminus, so that their journeys were shortened. In these days of frequent air raid alarms in London, the practice of the outer suburban stop of up express trains might well be reintroduced as a temporary war measure; particularly so with incoming evening trains, as, if a raid warning is in operation, with the speed of all trains reduced to 15 m.p.h., a passenger from, say, the L.M.S.R. Western Division main line to some outer suburban L.M.S.R. station may spend hours getting into Euston and out again, whereas if a stop of the express were made at Watford, direct access would be possible by electric services to a considerable area of North-West and West London without the lost time and added risk entailed by travelling into the terminus and back. Failing regular booked stops, it might be made the practice, if an air raid warning is operative, to stop incoming L.M.S.R. expresses at Watford, those of the L.N.E.R. at New Barnet or Finsbury Park, of the G.W.R. at Ealing Broadway, of the S.R. at Surbiton or Wimbledon, and so on, to afford passengers the opportunity of direct journeys home. Equally in the down direction, conditional stops of outgoing expresses at the same stations might obviate the loss of main-line connections by passengers who, in consequence of suburban delays in air raids, cannot reach the terminal stations in time to catch their trains.

* * * *

London Transport Rating

Valuation of the " transport undertaking " of the London Passenger Transport Board is governed by the Railways (Valuation for Rating) Act, 1930, as adapted by the London Passenger Transport (Valuation for Rating) Scheme and Order, 1935. The transport undertaking includes railways, tramways, and trolleybuses, but not motorbuses nor coaches. From the report of the Railway Assessment Authority for the year ended March 31, 1940, it appears that the draft of the first valuation roll of the transport undertaking, which operates from April 1, 1936, was settled by the authority on March 15, 1940. According to the amended draft roll, the total average net receipts of the transport undertaking for the two accounting years ended June 30, 1935, amount to £3,108,004, and the total net annual value (*i.e.* the cumulo) to £1,594,000. Comparable existing rating assessments upon the whole of the transport undertaking are understood to be approximately £1,026,000 net annual value. Of the cumulo of £1,594,000 there was allocated to railway passenger traffic £606,118, to railway goods traffic £15,542, to tramway traffic £207,220 and to " non-traffic " £765,120. Apportionment of the cumulo among all the transport hereditaments in accordance with the London Passenger Transport (Valuation for Rating) Scheme, 1937, involved the referencing and valuation of over 400 stations, works, and depots, and the estimation of passenger miles for every section of railway, tramway, and trolleybus route.

* * * *

Railways and Post Office—A Comparison

The manner in which the British railways have kept going during air raids and the blackout, redounds to their great credit. Though speed is reduced to 15 m.p.h. during an air raid, traffic still proceeds. The same cannot be said of the Post Office; though this week there has been some improvement, owing to the order that post offices shall remain open during warning periods. We quote the following comment from *The Spectator*: " At the present moment the Post Office appears to have largely abdicated its functions. Telegrams, even within the metropolitan area, take days instead of hours to reach their destination. Letters and parcels are subject to proportionate delay. Now the Post Office is so domestic and familiar an institution that few people realise its rôle as the central nervous system of the nation. Without a properly functioning Post Office business is impossible, and unless business can be carried on, the whole economic foundation of the war lapses. What has happened to the Post Office? As soon as a siren goes, though the business man may work on endeavouring to keep things going, Post Offices close. It would be interesting to know how long they actually remained open on Monday. Clearly it must now be recognised that by the simple expedient of sending over a plane every hour Goering could, on this basis, bring the greater part of British communications to a standstill." Until now the anomalous position has existed that railwaymen have been handling mail bags while Post Office staffs were idle in shelters. What would have happened had our railways been nationalised?

* * * *

Painting Problems

Some useful notes as to modern Canadian methods of dealing with the problem of painting bridges, stations and other structures were contributed to a recent issue of *Railway Engineering & Maintenance* by Mr. E. C. Neville, Bridge & Building Master, Canadian National Railways. The problem is all the greater on a system of such enormous size as this, seeing that over many of its lines in central and western Canada train services are so infrequent—in some cases only one train in each direction a day—and thus the difficulty of moving paint gangs and their living and equipment cars expeditiously on the completion of each job, so that their time may be used to the best advantage, is considerable. The most economical method of working the gangs to and from the minor jobs, such as the smaller stations, section tool houses, crossing shanties, and so on, is found to be by 2-ton motor trucks, which can handle a small gang with all the necessary equipment and material, including a spray painting outfit. In most cases the truck can be driven close enough to any of the buildings to enable the painting to be done without unloading the spraying plant, and it is often possible, where trackage permits, to move the truck round the buildings as the spraying proceeds. This method has also proved to be economical at large terminals, where a number of small buildings require attention. As regards outlying bridge painting, which often involves several jobs in the same vicinity, the boarding and outfit cars are run to the nearest station or siding, portable shelters are erected at each bridge to house the equipment, and motor trucks are used to convey the gangs between their base and their work.

* * * *

Steam Power for Heavy Fast Trains

For the haulage of high-speed trains the problem of steam locomotive design has been largely solved by careful attention to detail refinements. Developments in lubrication and

metallurgy, the use of high pressure and high superheat, combined with the streamlining of all the steam passages and an efficient exhaust; these may be regarded as the primary considerations affecting the engine. More recently attention has been directed to improvements in the locomotive as a vehicle, and springing and balancing have undergone improvement. The use of special light designs of valves, and of high-tensile steels in the driving gear, has contributed to the reduction of reciprocating weights, and this, together with investigations into balancing and the lateral spring control of carrying wheels, have led to the production of powerful locomotives capable of sustained high speed without punishment of the track. In this issue will be found details of an American attempt to produce steam power for very heavy, high-speed service. It combines most of the latest refinements referred to above, and the only matter of surprise is that, in so long and heavy a locomotive, such a high proportion of the reciprocating weight as 52 per cent. has been balanced, at the cost of a 7-ton hammer blow at 100 m.p.h.

* * * *

The Size of Locomotive Tenders

Although in America there is a tendency to increase the size and weight of locomotive tenders, some of the largest of which nowadays have coal and water capacities as high as 25 tons and 23,500 gallons respectively, and weigh when fully loaded over 180 tons, efforts are made in most other countries to avoid this and if possible reduce the amount of non-paying load it represents. When water pick-up apparatus was first introduced 80 years ago by John Ramsbottom on the then L.N.W.R., it was not merely for the purpose of cutting out stops for water replenishment but also to make possible the use of smaller and lighter tenders or, to be more precise, to call a halt to the introduction of larger and heavier ones. A considerable amount of inventive genius has been expended in past years with the object of emulating the function of the track water trough for taking on supplies of coal without stopping for the purpose; but the difficulties to be overcome in re-fuelling while the engine is in motion are necessarily great and we are not aware of any proposal aiming at achieving this which did not entail a very considerable reduction in speed. This being so, a high percentage of the usefulness of the invention disappeared as a matter of course.

* * * *

"Lines Behind the Lines"

Under the title "Lines Behind the Lines," which has already been made familiar by the advertising campaign of the British railways, the B.B.C. broadcast in the Home Service on September 20 a brief but vivid impression of the work of a great passenger terminus being carried on under war conditions. The programme, which was recorded by the Outside Broadcasting Department in collaboration with the L.M.S.R., was introduced by the Stationmaster at Euston, Mr. J. Harrison, who referred to the determination of British railwaymen to "carry on" under stress of blackout and air raids. Listeners then heard a series of records made at Euston giving sound-pictures of the work of the station—booking-office, platforms, signal-box, etc. This was followed with several short but striking interviews with "front line" railwaymen—signalmen, a breakdown train official, and an engine-driver whose train had recently been subjected to a heavy bombing attack. The last-named revealed that after one bomb had fallen close to the train, he stopped his engine and with his fireman sheltered under the tender. No sooner had they done so than another bomb struck the tender, but the men underneath it were unhurt. Emerging immediately afterwards, the driver's chief concern was for the safety of the engine's boiler, one of the steam pipes having been struck by a fragment. An impressive train departure concluded a short but interesting feature which represented excellent propaganda for the railways as a whole. The sound-effects and interviews were linked by an effective commentary by Mr. Wynford Vaughan-Thomas; railway collaboration, on behalf of the L.M.S.R. Publicity Officer, was by Mr. D. S. Barrie.

Sheltering in Tube Stations

IT is natural that the regularity with which the *Luftwaffe* pays nightly visits to the Metropolitan area should have resulted in a desire for something more in the way of air raid shelter than is provided by the A.R.P. arrangements made by the local authorities in co-operation with the Minister of Home Security. It is not a question of public doubt being cast upon the adequacy of such shelters as protection against most of the widespread effects of air raid bombardment, such as flying fragments, blast, and falling debris, but rather that workers living in the London area desire immunity from noise and space to lie down. Accordingly an insistent demand has arisen within the past two or three weeks that the London Passenger Transport Board should make available for such purposes its deep level tube stations. It will be recalled that at the beginning of the war London Transport issued a poster instruction, which was widely distributed, intimating that Underground stations must not be used as air raid shelters. In the latter stages of the war of 1914-19 extensive use of tube stations was in fact made, despite the many practical difficulties which come readily to mind. At the present time, however, the enormously greater range of raiding aircraft and the tremendously increased destructive force and power of penetration of modern bombs have altered the whole complexion of the situation, and in many cases the shallower portions of tube stations do not afford adequate protection. In fact flood-gates and other protective works (such as were described and illustrated in THE RAILWAY GAZETTE of October 13, 1939) have had to be installed at a number of tube stations in order to afford reasonable protection to the platform levels.

Until recently the order against using tube stations as air raid shelters has been enforced rigidly, and only *bona fide* passengers have been admitted during the progress of an air raid. About a fortnight ago, however, a widespread desire of many persons to take shelter in deep-level tube stations resulted in large numbers booking tickets for short journeys at the beginning of an air raid (or shortly before the sirens for a night raid were sounded) and then refusing to leave the railway premises. There are obvious practical and humanitarian difficulties about securing police co-operation to eject large numbers of persons into the open street during the progress of an air raid, and especially when the anti-aircraft barrage is "up," and accordingly the London Transport authorities have recently taken all practicable steps to meet the situation forced upon them, while officially not modifying the attitude they adopted at the outbreak of war, which was based on the combined consideration of expediency and safety.

Actually the present position may be regarded as a very broad interpretation of the practice of admitting only passengers and then not ejecting them during the progress of a raid, but, so long as the night raids last virtually for all the hours of darkness, considerable difficulties arise and have to be tackled by London Transport. Thus, station staffs must perforce remain on duty throughout the period that shelterers are on the premises. Essential lighting must be left on, if only to avoid panic and resultant casualties, and presumably no claim for the cost of this lighting lies against any public authority so long as the tube railways are not recognised as public air raid shelters. For a considerable portion of the night public train services are maintained and reasonable passage must be kept clear for the benefit of travellers. In normal circumstances there is a gap of only about four hours on weekdays between the departure of the last tube train and the arrival of the first next morning, and in present circumstances this interval is often shortened by the need to run extra late trains for the benefit of those delayed by air raids. Moreover, the brief gap during the night hours provides the only period available for effecting permanent way, signalling, and structural maintenance work, and undertaking cleaning and other sanitary services. Nevertheless, the London Transport staff has tackled the problem with a will. The nightly dormitory use of tube stations by members of the general public possessed of a travel ticket has now been officially recognised, and the stations are under police supervision. The police undertake redistribution, in co-operation with the station

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staffs, to avoid overcrowding at any one station, and London Transport is co-operating with the Ministry of Home Security in providing chemical toilet arrangements (for tube station platforms are below main drainage level), and other necessary amenities.

* * * *

Aldwych Branch Line

ENTIRELY apart from the question discussed in the foregoing article on the use of tube stations as air raid shelters, the London Passenger Transport Board is now making a further contribution to the protection of Londoners in turning over for exclusive use as a deep-level air raid shelter its branch tube from Holborn to Aldwych. A brief official announcement was issued to the effect that the Aldwych branch of the Piccadilly Line would be closed to all traffic after the last train on Saturday, September 21, and since then the work of its equipment as an air raid shelter has proceeded apace. Probably few Londoners realise that this short and relatively unimportant branch was planned originally to be the terminal section of one of the early tube railways, and it was the accident of merger that relegated it to the humble place it has occupied for over thirty years. When the Great Northern & Strand Railway Company was incorporated on August 1, 1899, it was intended that this tube line should extend from Finsbury Park to a terminus in the Strand. Then the undertaking came under the control of the late Mr. Charles Tyson Yerkes, together with another tube enterprise known as the Brompton & Piccadilly Circus Railway Company which had been formed on August 6, 1897. Yerkes and his American group decided to merge the two schemes; secured powers for a connecting link between Holborn and Piccadilly Circus; absorbed the South Kensington—Earls Court portion of an authorised deep-level District Railway tube between Earls Court and Mansion House; and provided through tube facilities between Finsbury Park and Hammersmith. The name of the Brompton & Piccadilly Circus Railway Company was changed by Act of November 18, 1902, to the Great Northern, Piccadilly & Brompton Railway Company, and it absorbed at that time the Great Northern & Strand Railway Company. The main portion of what since has become known familiarly as the Piccadilly Line was opened on December 15, 1906. This left the little spur from Holborn to the Strand as an unimportant branch. It was completed and opened on November 30, 1907, and since then has formed the subject of many discussions about whether it might prove the nucleus of a longer line passing under the river and projecting into South London. Nothing has resulted from such suggestions, and latterly a shuttle service has been maintained in one of the twin tunnels between Holborn and Aldwych (to which the original name of " Strand " was changed on May 9, 1915). Now, this line of 573 yd., or just under one-third of a mile, is to serve a purpose which will doubtless give it a popularity it has never enjoyed as a unit of the London tube system.

* * * *

Demolition of the Tower Station

AN interesting relic of London transport history has just disappeared now that the London Passenger Transport Board has demolished the former Tower station on the Inner Circle, facing Trinity Square Gardens on Tower Hill. As early as 1863 a Select Committee of the House of Lords recommended the construction of a complete Inner Circle railway in London, and in the next year Parliament gave the necessary sanction by authorising an extension of the Metropolitan Railway from Moorgate to Trinity Square, Tower Hill, and incorporating the Metropolitan District Railway to build the southern section between Kensington and Tower Hill. The Metropolitan, however, stopped short at Aldgate and made repeated but unsuccessful applications to Parliament for powers to abandon the section beyond, as it had come to the conclusion that the completion of the City section of the Inner Circle would be mainly for the benefit of the District Railway traffic and to the detriment of the Metropolitan. Long delays and costly Parliamentary contests took place, and, when it became obvious that the existing companies could not agree to complete the link, independent City interests took the matter in hand and formed a separate company. In the words of *The Railway News*, " Sir Edward Watkin exerted all his influence to prevent the company raising the necessary capital, and his efforts were crowned with success." Nevertheless, the Metropolitan realised that powerful forces were determined to see the completion of the railway and eventually Sir Edward Watkin was induced to work harmoniously with the District. Just before this, his final burst of independence resulted in the construction by the Metropolitan, under its existing powers, of the short length of line from Aldgate to Tower station, which was opened on September 25, 1882. This section was absorbed by the Metropolitan & District City Lines & Extensions which established a permanent station at Mark Lane when the link was completed on October 6, 1884. Tower station was closed on October 13, 1884, and has not been open since, although the wooden station building on the surface has remained virtually unchanged until now. Some reference to the antiquarian interest of the site is reproduced in our Scrap Heap columns (opposite) from a recent issue of *The Times*.

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Locomotives in Australia and New Zealand

A SURVEY of the locomotive position on the lines of the State railway administrations in Australia and New Zealand has recently been made by the Australasian Railway & Locomotive Society, and shows that, including 54 steam and 9 electric locomotives then under construction or on order, the total figures for steam and electric locomotives amounted to 4,113 and 33 respectively. Of the steam locomotives, 608 were tank engines, comprising 16 different wheel arrangements, and 29 were Garratt articulated locomotives of three types, the balance of 3,482 being tender engines of 15 types. The heaviest and most powerful locomotives were represented by the 4-8-4 type, of which there were 71 in service on the 3 ft. 6 in. gauge, New Zealand Railways and 10 on the 5 ft. 3 in. gauge lines of the South Australian Railways. The maximum tractive effort of the former was 30,800 lb. (or 36,800 lb. with booster), and of the latter 51,000 lb. (or 59,000 lb. with booster). Out of the total of 608 tank engines, the New Zealand Railways operated 184, and 125 were in New South Wales, 90 in Queensland, and 74 in Victoria. Of these the most powerful were a class of New Zealand 4-6-4 locomotives. All but two of the 29 Garratt articulated locomotives are built to the 3 ft. 6 in. gauge, and the most powerful, developing 32,000 lb. tractive effort, are to be found in Tasmania. The only railways operating electric locomotives are those of Victoria and New Zealand. In the former they are used in freight service over the electric suburban lines; in New Zealand electric locomotives are used in both main line and suburban services.

The past year has seen the conclusion of an extensive five-year period of locomotive construction in Australia and New Zealand, during which 177 new engines have been placed in service. At the time of the survey new designs were for five Pacifics for New South Wales, a 4-8-4 for Victoria and ten 4-8-2s for Western Australia. The N.S.W. Pacifics will have cylinders 21½ in. × 26 in., 245 lb. steam pressure, which is the highest in Australia, and 36,500 lb. tractive effort, and will weigh about 186 tons. They were briefly described and illustrated in our Overseas Special Number of November 29, 1939. The new Victorian locomotive will be the most powerful passenger engine in Australia, and will have three cylinders 21½ in. × 28 in., 220 lb. steam pressure, and coupled wheels 5 ft. 7 in. diameter. These engines will develop 55,000 lb. tractive effort, and the estimated weight will be 264 tons. The gauge is 5 ft. 3 in. The new 4-8-2 locomotive now building for the 3 ft. 6 in. gauge Western Australia Government Railways will have 19 in. × 24 in. cylinders, 200 lb. steam pressure, and 4 ft. coupled wheels. The tractive effort will be 37,000 lb. and the estimated weight 119 tons.

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THE SCRAP HEAP

Near a railway station in the London suburban area is displayed an announcement of a neighbouring cinema. As its locality may not now be mentioned, the management has pasted on the announcement a slip bearing the following words :—

One station up the line

This seems neat, and assumes that there are still persons who prefer to travel by rail where possible.

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FIRST BUSES IN HYDE PARK

" We are giving you a treat today," said a London conductor in charge of a bus laden with passengers that was travelling for the first time through Hyde Park yesterday.—*From the "Liverpool Post" of September* 18.

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VICTORIA'S GLASS TUNNEL

Eighty-year-old Victoria station, into the forecourt of which a Nazi plane came hurtling down yesterday, was originally a slightly better target from the air than it is today. I recall an old railway engineer telling me that the line, when new, was roofed with glass practically all the way from the river to the station. Property owners had objected in Parliament to the smoke and noise to be expected from a railway terminus in their midst. I believe the glass roof between the station and the Embankment was removed about 36 years ago.

In horse bus days you took a " Monster " to Pimlico; between them Victoria Street and Victoria station have changed the name of the district, conveniently, to " Victoria."—*From the " Evening Standard " of September* 16.

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BUSINESS OPPORTUNITIES

ARGENTINE RAILWAYS—Shareholders wishing to obtain dividends and save their capital invested should write for particulars to A.B. Casilla de Correo 2278 Argentina.—*Advertisement in " The Financial Times."*

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PROBLEM FOR THE CLEANER

A friend sends me the following instance of railway humour as a sequel to a raid on a North-East town where some damage was done to railway property. While the yardmaster and the district superintendent were inspecting damage to shattered offices on the morning after the raid, a subordinate official came up with the serious question. " Please, sir," he said, " the office cleaner has arrived, and she wants to know where she is to begin to clean."—*" Northerner II " in the " Yorkshire Post."*

DEMOLITION OF TOWER STATION

The former Tower of London station, facing Trinity Square Gardens on Tower Hill, is now in process of demolition by the L.P.T.B. It was opened on September 25, 1882, closed on October 13, 1884, and has not been opened since.

At the back of Trinity Place the railway construction was carried through a section of some 73 ft. of old London Wall. It was during this construction that the original stone of the Classicianus tomb was found under the second bastion of London Wall in 1887. During the erection of the sub-power station of the L.P.T.B. in 1937 a second stone was found and joined its predecessor at the British Museum. The stones are a direct link with Queen Boudicca, or Boadicea, for Procurator Classicianus was sent to Britain from Rome to pacify the tribes after the revolt had been put down. The removal of the wooden station building will permit of a better view of the fine existing remains of London Wall at this point from Trinity Square. The freehold of all Trinity Place, including the station, is already vested in the Tower Hill Improvement Trustees. After the war this site will form an extension of the present Wakefield Garden on Tower Hill, and the foundations of the Roman Wall will be fully disclosed by a trench on its eastern face.—*From " The Times " of August* 29.

(*See editorial on opposite page*)

A SCRAP HEAP—Portion of a large dump consisting of the wreckage of some of the German aircraft brought down in recent raids on England

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OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

ARGENTINA

$20,000,000 Loan for Argentina

Negotiations have just been concluded between the Central Bank of Argentina and the U.S. Import-Export Bank for the flotation of a loan amounting to $20,000,000 (U.S.), equivalent to $84,600,000 Argentine pesos, which will be transferred to the Argentine Exchange Fund administered by the Central Bank on behalf of the Government, and utilised exclusively for the payment of the importation of industrial and transport machinery from the U.S.A. It is stated that the construction of a pipe line from the Mendoza oilfields to San Lorenzo on the River Paraná will be financed out of the loan, part of which will also be invested in the purchase of rolling stock and other equipment for the State Railways, which was originally to have been obtained from Germany under the abortive barter agreement, cancelled owing to the war. The loan is repayable in three instalments at one, two, and three years, bearing interest at 3·60 per cent.

B.A.P.R. Siesta Car

An innovation in Argentine railway travel has been introduced by the Buenos Ayres & Pacific Railway in the shape of a Pullman siesta car, which is attached three days a week to the company's fast day train, El Cuyano, between Buenos Aires and Mendoza. This vehicle, which has been constructed in the company's workshops at Junin, derives its name from the attractive facilities for complete physical relaxation provided for passengers on the 15-hr. journey between those cities. The car has the following characteristics: (*a*) a large saloon with movable Pullman-type seats; (*b*) five siesta compartments with seats convertible into sofas—two compartments are provided with one sofa each, and three with two sofas; (*c*) two lavatory compartments; (*d*) luggage compartment; (*e*) attendant's and service compartment. The colour schemes are varied and attractive, and the general decoration and furnishings impart a pleasing and elegant appearance to the car.

Floods and Railway Freights

Owing to heavy floods in the south of the Province of Buenos Aires, the agriculturists and stock-breeders in certain districts have sustained serious losses to their crops and livestock, in addition to which ploughing and sowing operations have been rendered impossible within the affected zones. In this emergency, the Government, through the medium of the Ministers of Agriculture and Public Works, has addressed a note to the railways serving the province, pointing out the difficult situation in which the agriculturists are placed owing to the inundation of their property, and asking the companies to co-operate with the authorities in their efforts to assist the cattle-breeders by granting a rebate of 40 per cent. on the freight on cattle removed from the flooded area to safety zones, and similar facilities for the transport of fodder.

Rice Crop Estimate

According to the latest figures issued by the Ministry of Agriculture, this year's rice crop is estimated at 103,000 tons, or 7,500 tons less than the first forecast, because of damage by rain.

Institution Meetings

A meeting of the River Plate branch of the Institution of Mechanical Engineers was held in Buenos Aires on June 3, when Mr. E. C. Noble delivered a lecture on the Caprotti valve gear. The Chairman of the branch, Mr. A. T. Nickson, presided. At the July meeting of the branch a paper by Mr. W. F. Nixon entitled "Some Considerations for the Machine Shop," with special reference to the operations of cutting, grinding, drilling, turning, planing, milling, and boring of metals, was discussed.

A meeting of the Argentine and River Plate branch of the Institute of Transport was held in Buenos Aires on June 25, at which the Vice-Chairman of the centre, Major Oscar Loewenthal, General Manager, B.A.G.S. and B.A.W.R., delivered a lecture entitled "A Visit to South Africa," describing a tour of over 8,000 miles by rail and motorcar through the Union of South Africa, Northern and Southern Rhodesia and parts of the Belgian Congo and Portuguese East Africa. The Chairman of the centre, Mr. T. C. S. Haslam, presided. The lecture was illustrated by talking films lent for the occasion by Mr. Alwyn Zoutendyk, South African Consul-General in Buenos Aires.

INDIA

Famine Traffic on B.B. & C.I.R.

In a recent message to the traffic staff of the Bombay, Baroda & Central India Railway, the General Traffic Manager remarked, *inter alia*, that as a result of complete co-operation between all grades with the will and energy for which they had a proud reputation, records had again been broken in the rapid movement of wagons and in the successful handling of the heavy famine fodder traffic, which had saved the lives of thousands of cattle, and thereby preserved the people in the famine-stricken areas from ruin. The magnitude of the work that devolved upon the B.B. & C.I.R. in bringing succour to the large famine areas in Rajputana during the past eight months was great, and the handling of this exceptional fodder traffic in addition to an unusually heavy ordinary traffic has strained the resources of the railway to the uttermost. Where all deserve great credit, it is, perhaps, invidious to single out individuals, but the shunting staffs in the marshalling yards have done specially good work under exceptionally trying conditions. Many of the yards have been overtaxed by the volume of traffic moving, and only by the most skilful planning and redoubled effort could wagons be kept on the move. The fact that records in speed of wagon movement were attained on both the broad and metre gauge systems of the railway is sufficient proof of the success of these efforts.

Famine fodder traffic is carried at exceptionally low rates, and large numbers of cattle have been transferred at equally low rates from the famine areas to districts where grazing is available.

S.I.R. Insulated Vans

In order to afford better facilities for the transport of perishable goods such as iced fish and fruits, the management of the South Indian Railway has built experimentally a new type of insulated van for service on fast broad gauge passenger trains. The van has a carrying capacity of 9 tons and is divided into three insulated compartments each having a separate ice container. No extra charge is levied for traffic booked in this van, but for its exclusive use the minimum weight for charge is 100 maunds or about 3·7 tons.

U.S.S.R.

Siberian Railways

Passengers by the Trans-Siberian Railway report that intense activity was evident throughout the run from Moscow to Vladivostok. Goods traffic is very heavy, and trains travel eastwards at frequent intervals both by day and by night. Several military trains were also passed daily, and there is no doubt that the recently-completed doubling of the line throughout the 5,000 miles has been fully justified. Permanent way maintenance is, however, said to be suffering from the heavy traffic, and the wreckage of two accidents was passed—one involving a passenger and the other a goods train—during the 10-day journey.

Various New Railways

In addition to (1) the Lena river line from west of Lake Baikal to the Arctic Sea, (2) the branch from (1) north of that lake to Komsomolsk and the mouth of the Amur river, and (3) another from Khabarovsk to the mouth of the Amur river, all of which are in operation, a further line is under construction, skirting the Sea of Othotsk and running down the Kamchatka Peninsula to the port of that name. Great activity is also manifest at all the ports along the coast, and new towns are springing up, equipped with large factories, throughout eastern Siberia.

It is stated that the 168-mile line from Donskoye to Kandagach, in the Urals, is likely to be completed by October next: some 6,000 workers are employed on its construction.

AXLE STRESSES—I

A study of the bending moments in carrying and driving axles of locomotives and rolling stock

By GEORGE W. McARD

NOTWITHSTANDING the very considerable number of axles in daily use on railways in Britain and overseas, axle stress is a subject that has received comparatively little attention, and many of the papers which have dealt with the subject have either treated it from a purely academic viewpoint or concentrated on one particular type of axle. In the following article it is proposed to give a practical and comprehensive survey of the methods used in determining the stresses due to the various factors involved, and in a manner that lends itself best for recording the stresses of all axles operating on the system, or, in the case of a private contractor, all axles supplied. The subject may be broadly classified under two main heads, namely :—

(*A*) Axles used solely for carrying purposes.
(*B*) Axles used for both driving and carrying.

These, however, should be still further subdivided into—

(*A*) Carrying axles : (1) unbraked (chiefly locomotive bogie and truck).
(2) braked.
(*B*) Driving axles : (1) locomotive, straight.
(2) ,, cranked (for two, three and four-cylinder locomotives).
,, motor-driven (through spur gears).
(4) diesel car, worm-driven.

To develop the subject in a rational manner it is proposed to consider first of all axles which have but one function to perform, namely that of transporting a load, and from this simple basis to build up the data to cover the more complicated cases. Before proceeding to consider the stress aspect of the subject, however, there is the almost equally important question of journal bearing surface to decide, and it is at once recognised that this may be, and indeed frequently is, dependent on factors totally outside the scope of the present article. Where, however, the designer's hands are not tied by questions of axlebox patterns and duplication of boxes, the following bearing pressures can be adopted :—

	Lb. per sq. in.
Locomotive leading bogie journals	150
,, trailing truck journals	170
,, driving journals	180
,, tender journals	250
Coaching stock journals	280

Where roller or ball-bearing axleboxes are to be used, the maximum load which the journal is to sustain must be supplied to the manufacturers and their proposals checked to ensure that the proportion of the axle will be ample where these bearings will be fitted, and the stress within permissible limits. As a check on the journal proportions, what is called the load speed factor is frequently used for plain bearings, and is obtained from the product of the unit bearing pressure and the peripheral speed of a point on the journal surface, the terms being in lb. per sq. in. and ft. per sec. respectively.

Unbraked Carrying Axles

For locomotive bogie axles where no brake is fitted this becomes a simple beam calculation with the maximum bending moment (BM) lying between " XX " (see Figs. 1 and 2). For coaching stock with an appreciably higher centre of gravity than is found in the locomotive, the

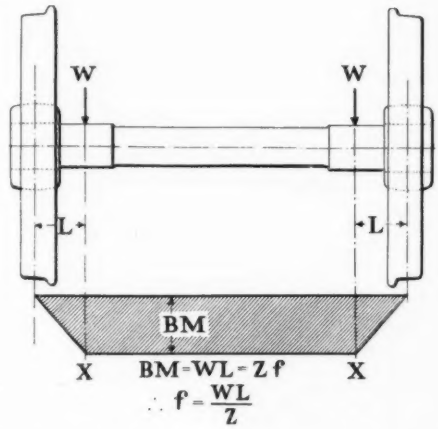


Fig. 1—Bending moment diagram of inside bearing unbraked carrying axle

bearings are subject to an increase of load due to the overturning tendency when rounding curves ; also to wind pressure on long exposed stretches of track.

An additional loading which is occasionally considered for bogie and truck axles on locomotives is that due to the impact of rail and wheel flange when the guiding function of these is in operation. This, however, is somewhat in the nature of a shock load and difficult to define with any certainty as other relieving factors are at the same time acting favourably for the axle and these reduce the theoretical value of the stress set up.

A coupled axle, in certain positions of the locomotive framing, may be even more seriously affected by the impressed load from the rail through the wheel flange when negotiating comparatively sharp curves, especially if no allowance is made by the thinning or total elimination of the flange, but allowance for such extremes must be provided for by keeping the permissible stress—obtained

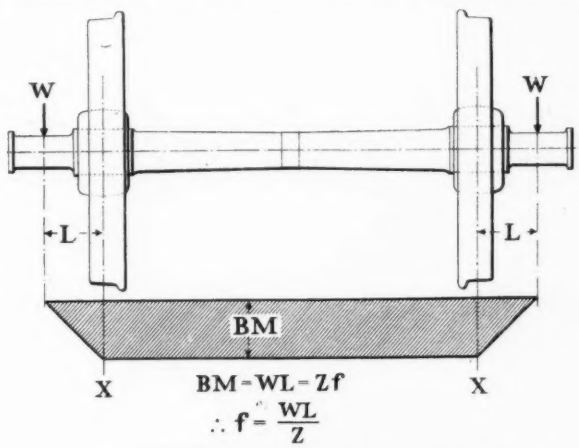


Fig. 2—Bending moment diagram of outside-bearing unbraked carrying axle

by calculating the known load factors—within safe limits. These will depend more particularly on the practice of the railway company or contractor who is responsible for the unit under consideration, but one leading authority uses a value of 10 tons per sq. in. as a maximum. Where the axle stress is due solely to journal loads and brake forces, the axle diameter as determined by the journal bearing pressure, will usually give a fairly low stress value.

Braked Carrying Axles

For all such cases the resultant BM is obtained by a combination of the bending moments due to the journal loads (operating in the vertical plane) and the braking force applied to the tyre through the brake block (in this case, of course, acting in the horizontal plane). Figs. 3 and 4 illustrate this case clearly, BM_1 being the bending moment due to the journal load, BM_2 that due to the braking effort, BM*r* the resultant bending moment which equals $\sqrt{(BM_1)^2 + (BM_2)^2}$. Whether the braking effort

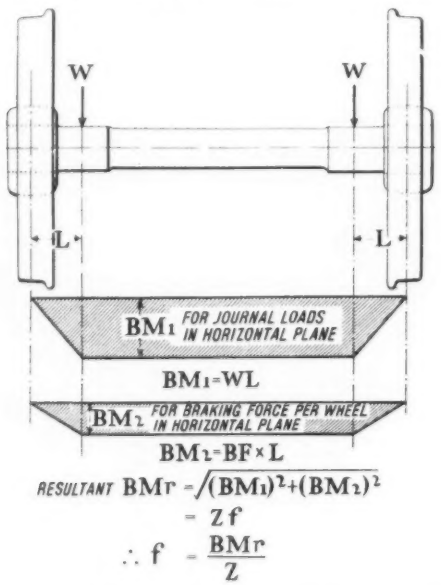


Fig. 3—Bending moment diagram of braked carrying axle with inside bearings

is applied through one block only per wheel or through two blocks—

$BM_2 = BF \times L$ where BF = braking force per wheel in tons, and L = distance from centre of journal to centre of wheel tread in inches.

Although at first sight it might appear that, where the retarding effort is obtained through the medium of two blocks per wheel, no bending moment due to braking can occur in the axle, actually the result is the same whether one or two blocks are used, as in the latter case the same horizontal bending moment is set up by the pressure of the axlebox on the guides, the upper structure tending to advance and the axle holding back.

A further factor comes into play for carriage axles as mentioned in Case *A* (1), where reference is made to the overturning effect under specified conditions. Fig. 5 shows the method recommended for determining the stress under such conditions, and those readers who wish to make a more intimate study of this section of the subject are recommended to read Mr. W. Heaton's paper on "Carriage Bogie Design" in Journal No. 62 of the Institution of Locomotive Engineers.

(To be continued)

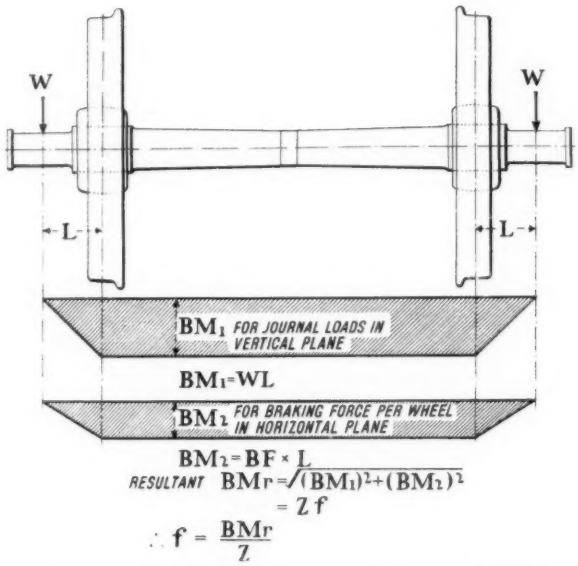


Fig. 4—Bending moment diagram of braked carrying axle with outside bearings

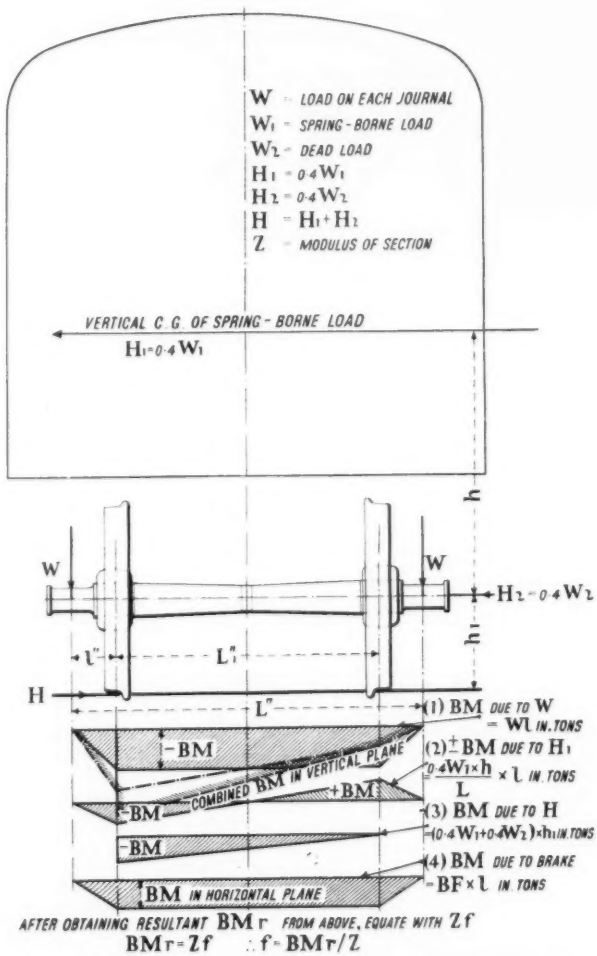
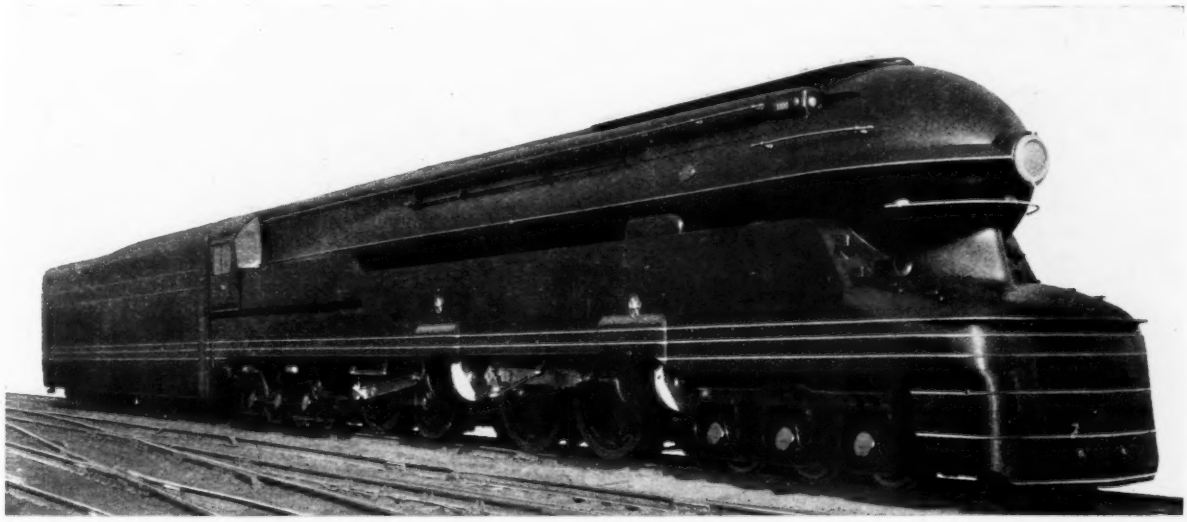


Fig. 5—Bending moment diagram of carriage axle including allowance for overturning effect at speed

NEW 6-4-4-6 EXPRESS LOCOMOTIVE, PENNSYLVANIA RAILROAD

Further details of an interesting design intended for the haulage of heavy passenger trains at speeds up to 100 *m.p.h.*

IN THE RAILWAY GAZETTE of April 28, 1939, there appeared a brief illustrated description of the 6-4-4-6 type locomotive specially designed for high-speed operation on the Pennsylvania Railroad. The design and construction of this engine resulted from joint deliberations between the American Locomotive Company, the Baldwin Locomotive Works, the Lima Locomotive Works, and the mechanical authorities of the railway, and in view of its many interesting features we now add further particulars,

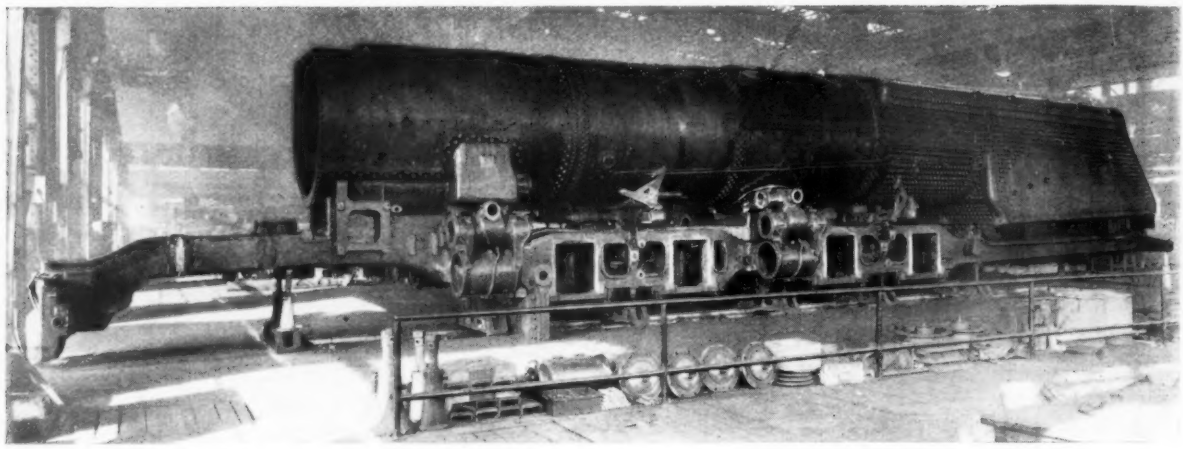


General view of the experimental Pennsylvania high-speed locomotive for long-distance runs

supplemented by drawings and photographs, placed at our disposal by Mr. F. W. Hankins, Vice-President and Chief of Motive Power, Pennsylvania Railroad.

The engine has been designed to haul trains of 1,200 short tons at 100 m.p.h. on level tangent track, and in these circumstances it is estimated that it will indicate 6,500 h.p. To provide this high power output a large boiler is, of course, necessary, and this, together with the cylinder arrangement adopted, is responsible for the novel wheel grouping involving the use of two six-wheel bogies and two independent sets of four-coupled wheels, each driven by a separate pair of 22 in. by 26 in. cylinders. The boiler, which carries a working pressure of 300 lb. per sq. in., is built of nickel-steel plates, having a tensile strength of from 34 to 38 tons per sq. in. The firebox is of the modified Belpaire type, as is common in Pennsylvania RR. practice, and the inner firebox, which is fitted with a combustion chamber 9 ft. 5 in. long, is of low-carbon steel complying with the A.S.T.M. specification. The usual arch tubes extending between the throat and door plates are not fitted; their place is taken by seven sets of tubes called circulators. Each of these consists of a $5\frac{1}{2}$ in. tube spanning the firebox transversely, and opening into the water space on each side. The tubes curve slightly upwards, and in the centre of their length they join and lead into larger vertical tubes $7\frac{1}{2}$ in. in diameter, the upper ends of which open into the water space along the centre of the crown plate. The arch is supported by the transverse members of this tube installation which adds 113 sq. ft. of heating surface to the firebox, making a total of 660 sq. ft.; the grate area is 132 sq. ft. There are 219 $2\frac{1}{4}$ in. tubes, and 69 $5\frac{1}{2}$ in. flues for the type A superheater, which has single-pass elements; the length between tubeplates is 21 ft. $10\frac{13}{16}$ in. At the firebox end the barrel has an outside diameter of 8 ft. 4 in. and at the smokebox end of 7 ft. 9 in. The boiler has 5,661 sq. ft. of evaporative heating surface, and the combined heating surface is 7,746 sq. ft. Firing is effected by means of a type H.T. Standard stoker, and a Worthington type 6.S.A. feed-water heater is provided. The heater portion is fitted in the top of the smokebox in front of the double chimney, and the hot water pump is carried by the engine frame in front of the smokebox. There are two blast pipes, one for each pair of cylinders, and the exhaust passages, which are cored in the bed casting, also have communication by means of cored ducts with a connection to the feed-water heater located in the smokebox.

The engine frame consists of a single steel casting manufactured by the Commonwealth Company, including the four cylinders with their steamchests and hind covers, the saddle, and all the necessary brackets and facings for the various fittings and attachments. The weight of this frame, the largest so far cast, is $44\frac{1}{2}$ tons. The coupled wheels are 7 ft. 0 in. diameter, and have Baldwin disc centres of high-tensile cast steel, made by the Standard Steel Works. On account of the short piston stroke of 26 in. the crank pins are offset in order to obtain sufficient metal in the wheel centres between the axle and crank pin fits. This has resulted in the throw of the coupling rods being $14\frac{1}{8}$ in., as against 13 in. for the big ends of the connecting rods. Each set of four coupled wheels has a wheelbase of 7 ft. 6 in., and each leading pair is allowed a total



The boiler lowered on to the frame structure in the Juniata shops of the P.RR. at Altoona

side displacement of 1 in.; they are centred by an Alco lateral control device. The coupled axles have Timken roller bearings in single piece housings of cast steel. The two six-wheel trucks have cast steel Commonwealth frames, and Timken roller bearing journal axleboxes, though the design is such that S.K.F. boxes may, if desired, be applied. The leading bogie truck is fitted with the Alco geared lateral motion control. Each axlebox has an overhead laminated spring, and the leading axle springs are cross equalised at the rear, whilst the centre and hind axles are equalised together, an arrangement giving three point suspension of an unusual kind.

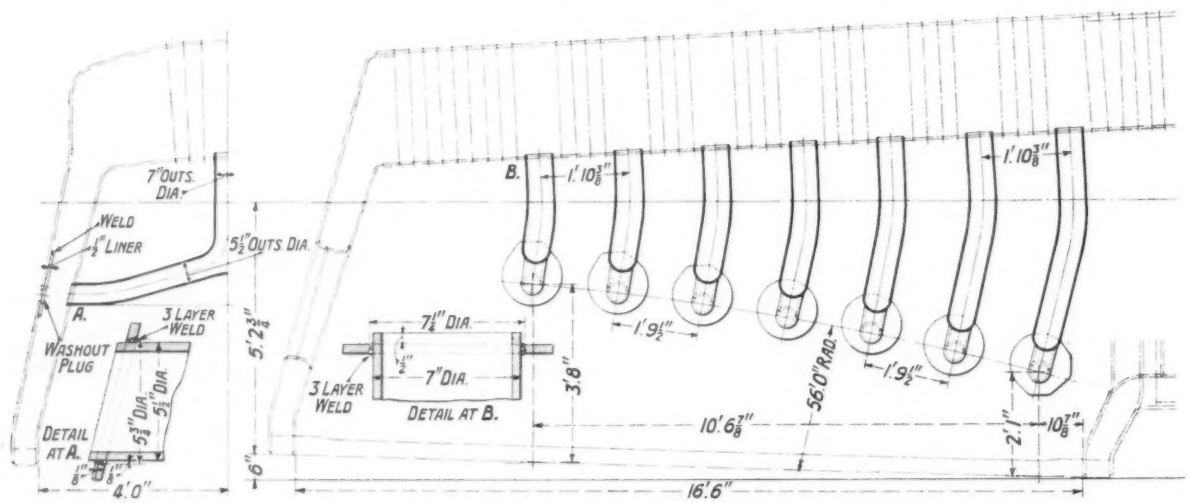
The trailing bogie is of the Delta pattern, differing only in essential features from the usual design in the number of its axles, of which there are three in place of two, as is now common for large engines. It has, however, a detail of some interest in that provision is made for lateral motion of the leading and intermediate axles, for which purpose a series of three small rollers is fitted between the top of each axlebox and the spring pillar, which is specially formed to suit. The weight is taken through these rollers, which at the same time facilitates the transverse movement of the axleboxes relative to the framing. The overhung laminated springs are compensated on each side, and connect with the spring system for the trailing coupled wheels through the usual form of cross compensation arrangement. All bogie wheels are made of rolled steel and are 3 ft. 0 in. diameter. Each bogie has its own independent brake gear, there being two W.A.B. brake cylinders mounted on the leading bogie framing and four fixed outside; two on each side of the frame in the case of the trailing bogie. Clasp brakes are fitted, and the rigging is fully compensated. Each coupled wheel has two brake blocks, and the braking ratio percentage is approximately as follows:—

Leading and trailing bogies	60 per cent.
Coupled wheels	70 ,,

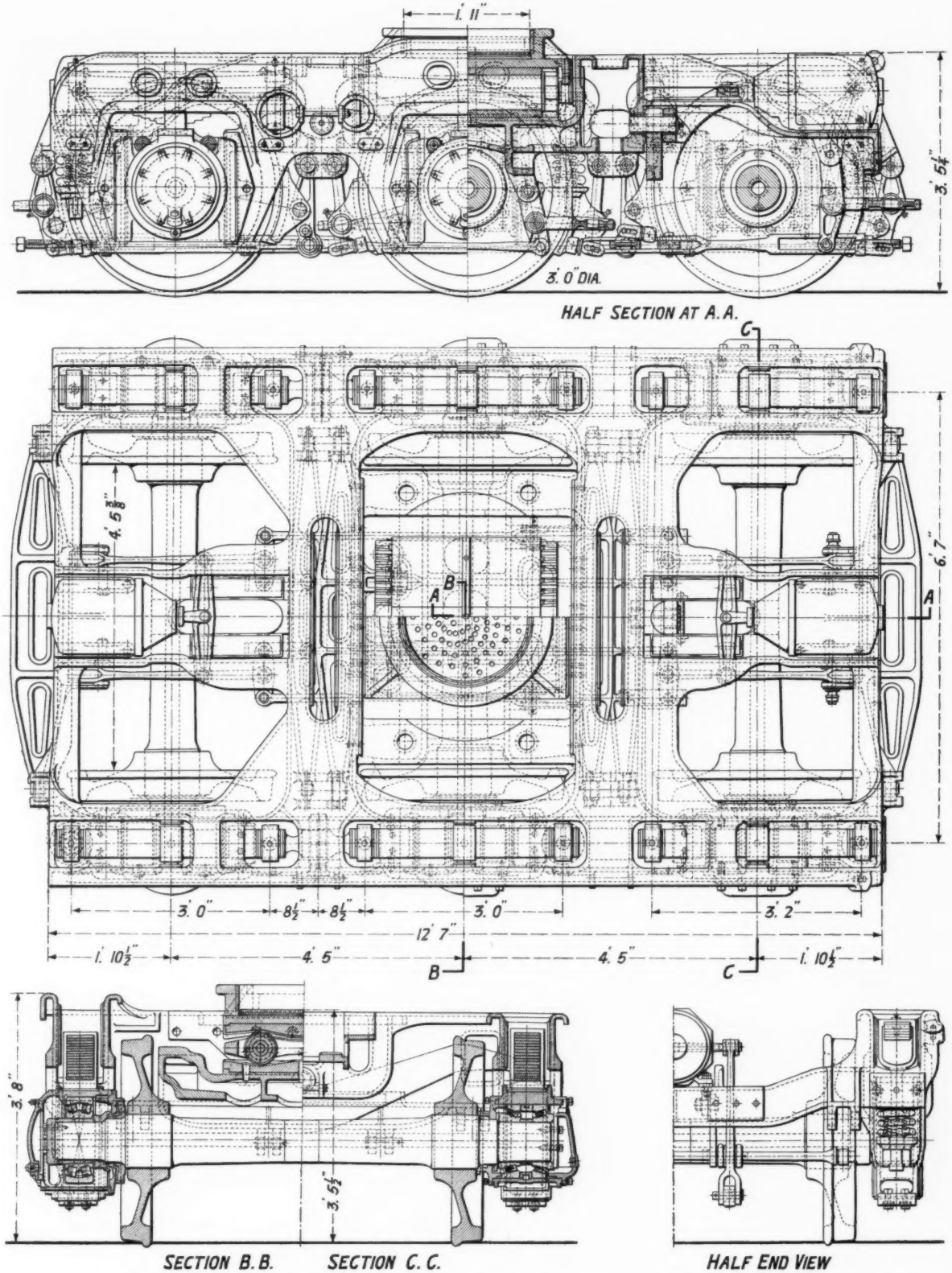
Tender bogies 75 per cent. of empty weight, plus 25 per cent. of the full load.

The engine spring gear consists of reverse camber laminated overhung springs for the coupled axles, continuously equalised throughout, and cross equalised with those of the trailing bogie as already mentioned. Transverse connection is made between the driving spring links on each side of the engines where they are coupled to the equalising beams for the coupled axles and also at the leading end of the spring link system where connection is made to the main frames through the medium of coil springs in compression.

Close attention was given to the design of the cylinders



Details of the transverse circulator tubes fitted to the coal-burning firebox of the Pennsylvania 6-4-4-6 locomotive



General arrangement of the leading bogie of the 6-4-4-6 high-speed locomotive, Pennsylvania Railroad

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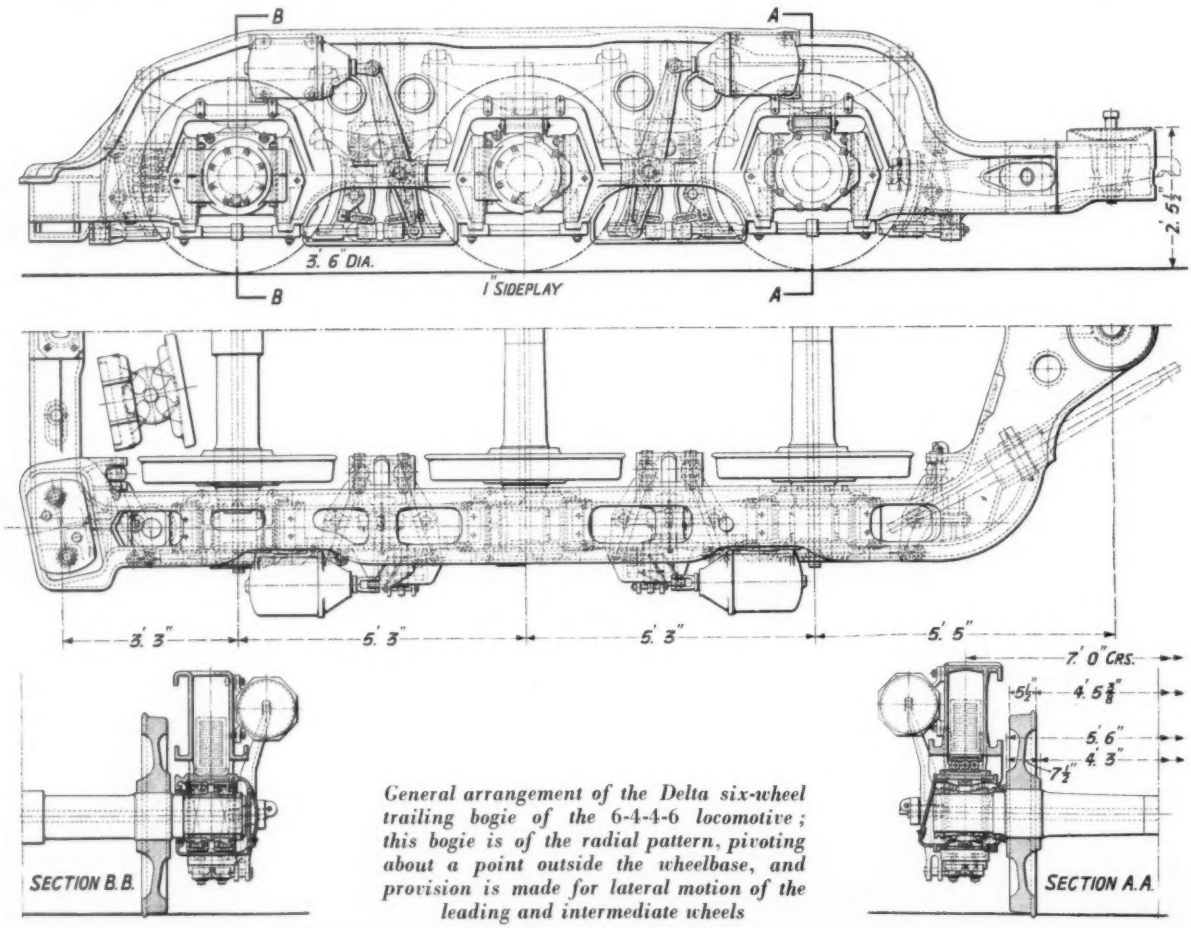
and valve motion, in view of the importance of obtaining an easy steam flow through the cylinders, and also the desirability of reducing weight, particularly of the reciprocating masses. Steam is supplied to the cylinders through a series of slots in the upper part of a collecting pipe in the boiler barrel. The American multivalve throttle is formed with the superheater header, whence the steam is conveyed to the cylinders by branch pipes which pass through the smokebox sides, and are each flanged to Y-piece castings located in pockets cast with the saddle, and flanged to the side of the smokebox. The vertical legs of these castings connect to the steamchests of the forward cylinders, and the horizontal legs to the rear wall of the pocket to which it is jointed. On the outer sides there are flanges for pipe attachments, one on each side, taking the steam back to the rear pair of cylinders. The exhaust from these cylinders leads into cored passageways in the engine bed, and from here there is a 10 in. pipe leading to the exhaust cavities cored in the base of the saddle section. Expansion joints are provided in the main steam and exhaust piping.

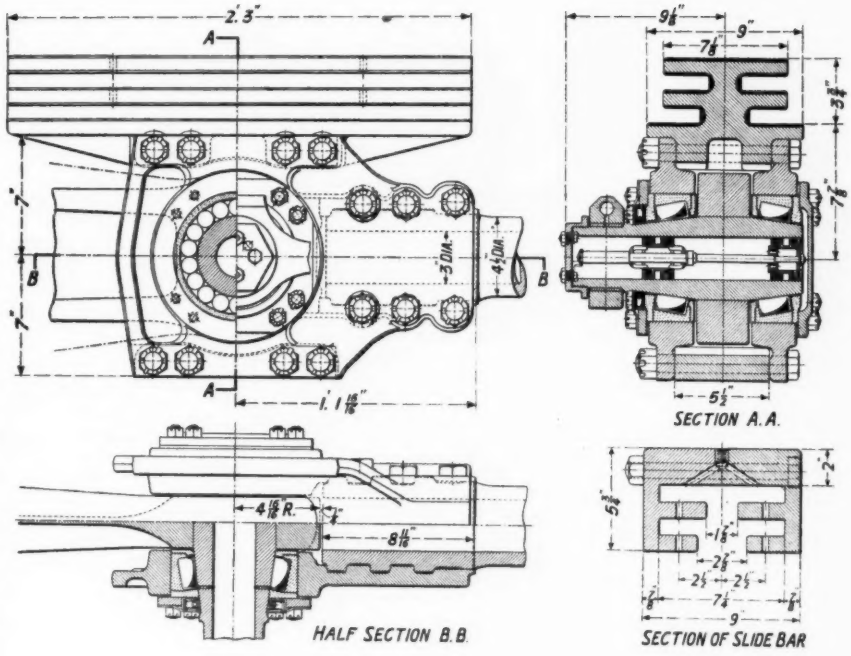
For the steam distribution, valves of 12 in. diameter are used for the 22 in. diam. cylinders, operated by a light design of Walschaerts gear giving a full-gear valve travel of $7\frac{1}{2}$ in., and all four sets of valve motion are controlled by a single Alco power reversing gear. The valve gear parts are of low-carbon 2·5 to 3 per cent. nickel steel, normalised and tempered, with the exception of the expansion links which are forged from carbon steel. In its design the motion follows past practice on the Pennsylvania RR. which as far back as 1914, when the "E6S" Atlantics were built, commenced the use of nickel alloy steel to obtain light-weight motion parts.

The connecting and coupling rods are of fluted section, and are made of nickel alloy steel to the same specification as that used for the valve gear. Floating bushes are applied at the crank pin ends. Those in the coupling rods have spherical surfaces on their outer diameters to permit of the lateral play allowed the leading coupled axles. The pistons are steel forgings machined all over, and mounted on hollow piston rods. Underhung crossheads are used; they are of the two-piece bolted type, and are fitted with aluminium alloy shoes of the multi-ledge design, working in two-part guides, each of which is machined out to receive the ledges formed in the crosshead shoes, and held together by through bolts. The gudgeon pins are a tight fit in the connecting rod ends, and run in roller bearing assemblies mounted in the crosshead body pieces.

The piston rods have a parallel fit for the piston heads, which are shrunk on, and to facilitate obtaining the correct length between the piston and the centre of the crosshead a piston rod spacer ring is fitted between the piston and a collar turned on the rod. At the crosshead end these rods are formed with a series of collars having tapered sides, and when fitted in the crossheads they are held in the latter, the two parts of which are machined out to suit. The two sides of the crosshead body are firmly bolted together with through bolts, which enable the body pieces to hold the piston rods by means of a tight draw fit on the collars and at the same time hold the shoe in place. Below the gudgeon pins suitable distance pieces are fitted to maintain correct spacing between the



General arrangement of the Delta six-wheel trailing bogie of the 6-4-4-6 locomotive; this bogie is of the radial pattern, pivoting about a point outside the wheelbase, and provision is made for lateral motion of the leading and intermediate wheels



Arrangement of crosshead with multi-face shoe to take up the thrust from a piston load of 114,000 lb. The single slide bar is above the crosshead, and the gudgeon pin bearing is of the roller pattern

crosshead side pieces. At the piston end the piston rods are plugged, and the ends riveted over. The piston packing rings are of a special sectional type, made of a bronze alloy, and they are so formed that the piston is carried on the rings, and thus no part of the piston head can rub on the cylinder. This means that a steel piston can be used without a bull ring of cast iron or other material, and a considerable saving in weight is effected. The pistons together with the rods and crossheads are of a design provided by the Timken Roller Bearing Company, and are made of an alloy heat-treated steel, also developed by that concern. The chemical and physical characteristics are:—

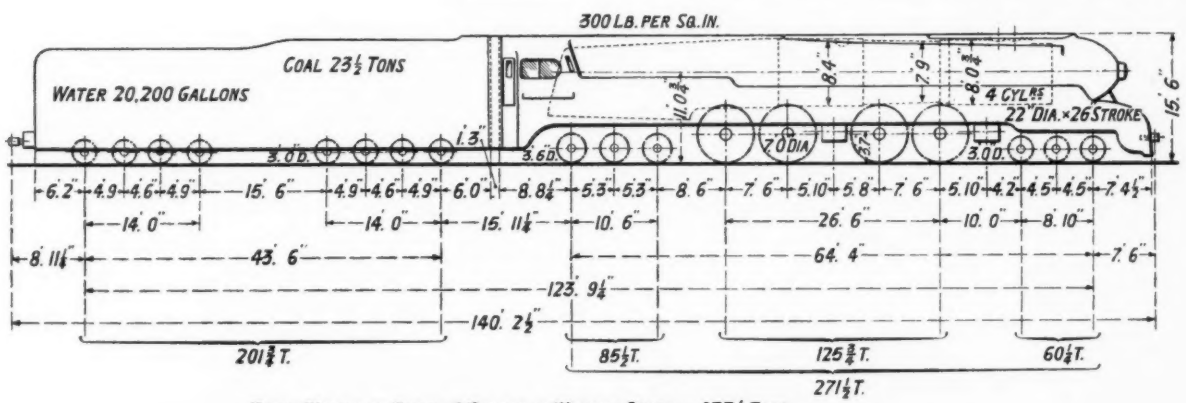
Chemical properties	
Carbon	0·40–0·43 per cent.
Chromium	0·70–0·80 ,,
Nickel	1·70–1·80 ,,
Molybdenum	0·28–0·33 ,,
Manganese	0·70–0·80 ,,
Physical properties	
Yield point	110,000 lb. per sq. in. min.
Elongation	20 per cent. min.
Reduction of area	55 ,, ,,
Brinell	269 min.
Izod	50 ,,

The use of this design in conjunction with the material employed has resulted in a much reduced weight for the reciprocating parts, the weight on each side being only 1,010 lb.:—

Piston head, rod, rings, and springs complete	327·5 lb.
Crosshead, pin, and bearings	423·0 ,,
Front half connecting rod	216·0 ,,
Union link	17·5 ,,
Lap and lead lever lower half	26·0 ,,
Total	1,010·0 ,,

As the two cylinders have a diameter of 22 in. this, with steam at 300 lb. per sq. in. pressure, gives a piston load of 114,039 lb. or 111·9 lb. per lb. weight of the reciprocating parts. The revolving, and 52 per cent. of the reciprocating, weights are balanced. The latter are equally divided between the coupled wheels, and at 90 m.p.h. it is calculated that this excess weight in the wheel balance produces a dynamic augment equal to 12,550 lb., and at 100 m.p.h. 15,500 lb., or approximately 7 tons.

Mechanical lubrication is provided for the cylinders and valves, for which purpose two Nathan lubricators are fitted on the right side for each pair of cylinders. There are top and bottom connections to each cylinder barrel, and one to each steam pipe near the valve chamber. Atomisers are fitted for the lubricating connections to the steam pipes and for the oil supply to the top of the cylinder barrels. There is one oil connection to each of the guides. Oil pipes are fitted from the front cylinder lubricator to the feed-heater pump steam pipe, and from the rear lubricator for the stoker engine. On the left side a further mechanical lubricator supplies oil for



TOTAL WEIGHT OF ENGINE & TENDER IN WORKING ORDER = 473¼ TONS.

Diagram of the Pennsylvania high-speed experimental locomotive introduced last year

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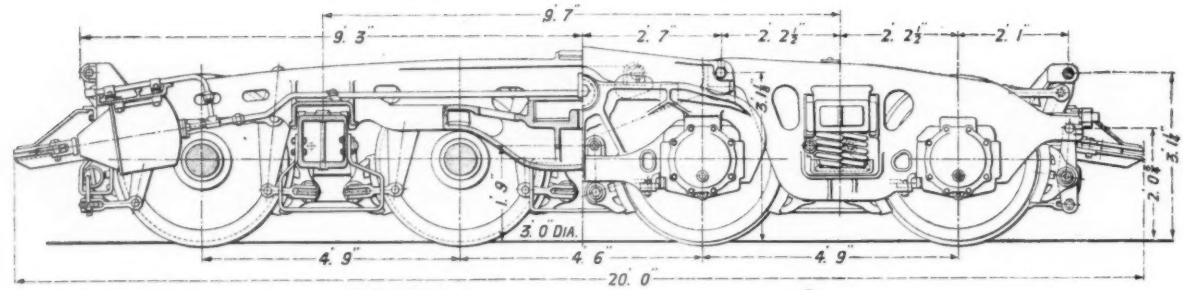
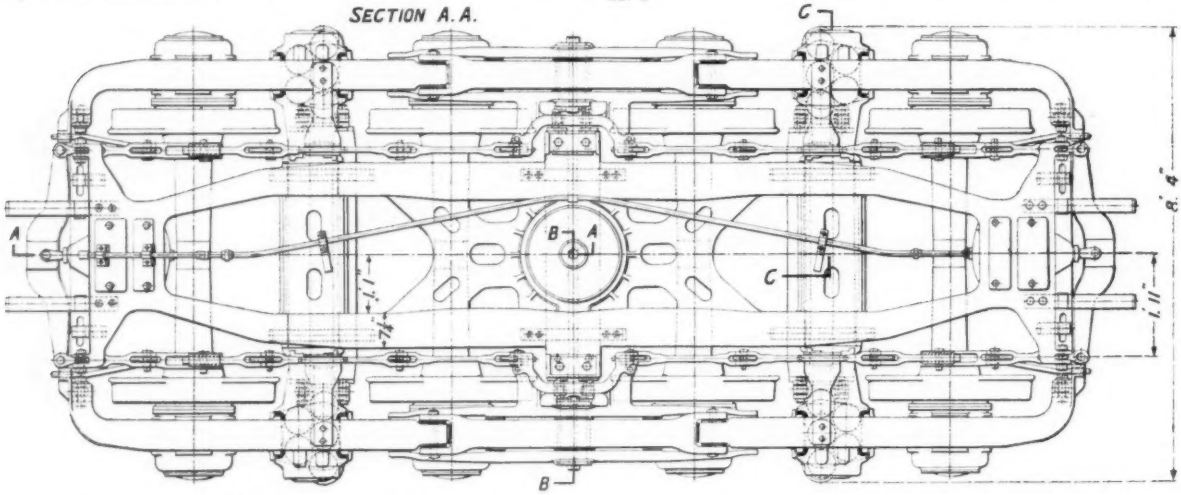
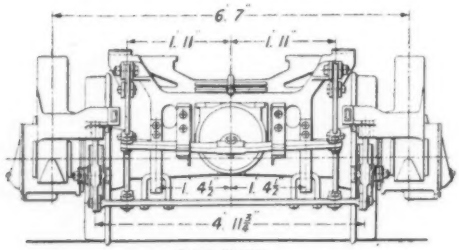
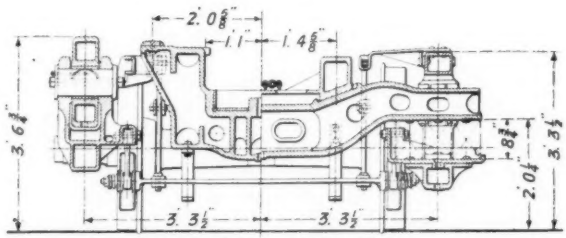


SECTION A.A.

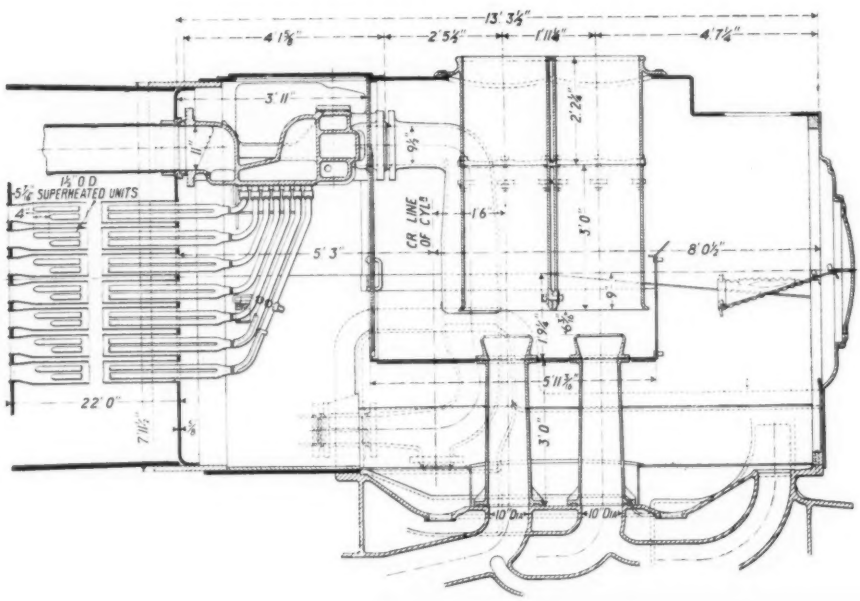




END VIEW



SECTION B.B. SECTION C.C.



Above: General arrangement of tender bogie; and (right) details of superheater and front end showing double blast arrangements, Pennsylvania 6-4-4-6 locomotive No. 6100

MAIN DIMENSIONS OF PENNSYLVANIA 6-4-4-6 EXPRESS STEAM LOCOMOTIVE

Cylinders (4), dia.	22 in.
,, stroke	26 in.
Coupled wheels, dia.	7 ft.
,, ,, leading truck	3 ft.
,, ,, trailing truck	3 ft. 6 in.
Evaporative heating surfaces—	
Tubes and flues	5,001 sq. ft.
Firebox	660 ,,
Total	5,661 ,,
Superheating surface	2,085 ,,
Combined total	7,746 ,,
Firegrate area	132 ,,
Boiler working pressure	300 lb. per sq. in.
Tractive effort (at 85 per cent. boiler pressure)	76,400 lb.
Engine weight in working order—	
On all driving wheels	125¼ tons
On leading truck	60¼ ,,
On trailing truck	85½ ,,
Total	271¼ ,,
Tender weight loaded	201¾ ,,
Total weight of engine and tender	473¼ ,,

the lubrication of the axlebox guides. The three lubricators are driven by connections to the valve gear links. The arrangement of the sanding gear is interesting; it consists of pipes fitted for both sets of coupled wheels of the leading engine and for the rear drivers only of the hind engine. These are fitted for forward running. When making brake applications, sanding may be obtained by depressing the brake valve handle, and when making emergency applications sanding takes place automatically; in addition there is an independent control valve.

The tender is of welded construction, and is mounted on a cast-steel water-bottom underframe 58 ft. 10¼ in. long, and weighing 38¼ tons. The eight-wheel bogies are of the Buckeye design supplied by the Buckeye Steel Castings Company. Timken roller-bearing axleboxes are fitted, and the rolled steel wheels have a diameter of 3 ft. 0 in. Clasp brakes actuated through compensated rigging are applied, and there are two brake cylinders mounted on each bogie. The method of streamlining adopted is based on that previously used for some of the Pennsylvania Pacifics. The new engine has been built at the company's Juniata works at Altoona, and is now on exhibition at the World's Fair, New York, where it was also a feature last year.

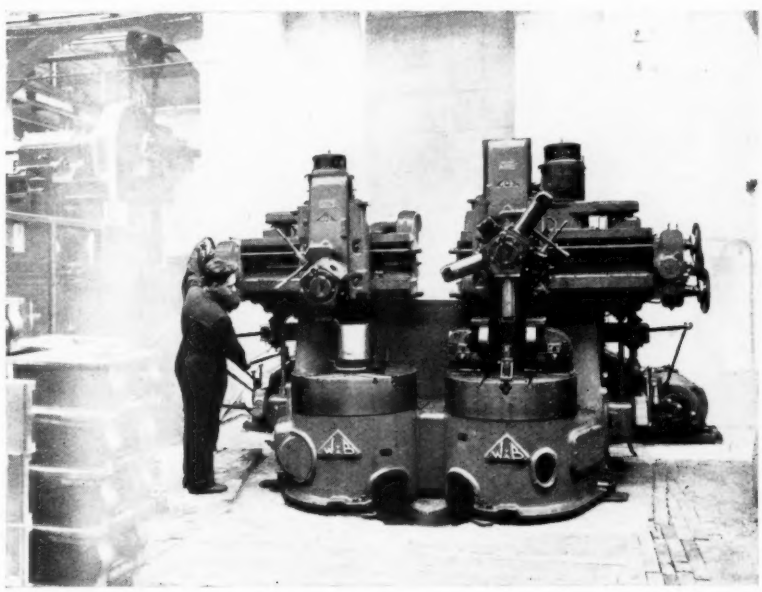
NEW MACHINE TOOLS AT DONCASTER WORKS

Webster & Bennett duplex boring and turning mill

AMONG the latest machine tools to be installed in the Doncaster locomotive works of the L.N.E.R. is the Webster & Bennett duplex boring and turning mill illustrated herewith.* This is one of the maker's newest series "D" high power range covering three sizes, namely, 36 in., 48 in., and 60 in., each of which is made in three standard speed ranges, to suit various classes of work and material.

The machine shown is the 36 in. size which has a normal range of 5·6 to 125 r.p.m. in 12 steps, and is driven by a 15 h.p. motor at approximately 1,440 r.p.m. There are 12 feeds ranging from 0·005 in. to 0·25 in. and rapid power traverse of the tool is obtained from an independent motor. The leading constructional features include a separate one-piece base and column for each table, ground spline shafts, ground gears and ball and roller bearings. Both turret head and chuck are powerful units. The machine was introduced in the Doncaster works primarily for the machining of locomotive axleboxes; one table is specially adapted for the fitting of an axlebox fixture designed and supplied by the makers of the machine.

The standard four-jaw independent chuck with jaws removed carries the axlebox fixture, and the machine can be quickly changed over for general purposes. The feed range due to the machine operating on the white-metal faced axleboxes varies from 4 to 200 cuts per in. and with this scope available it is found that axleboxes can be machined much quicker than was formerly the case and with a better degree of finish. The second table which is not fitted with reverse motion is used for the machining of such details as locomotive cylinder and steamchest covers, and similar work. The machine is fitted with vernier graduated scales, and all controls are localised.



New series Webster & Bennett boring and turning mill at Doncaster works

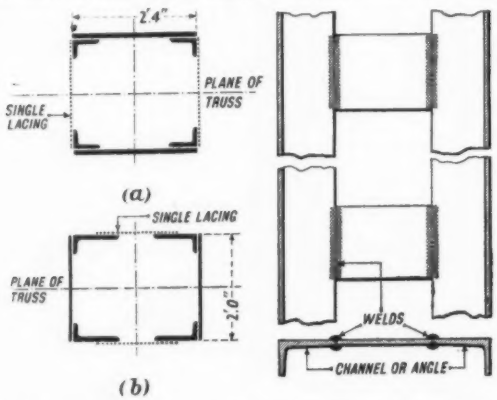
* By courtesy of Sir Nigel Gresley, Chief Mechanical Engineer, L.N.E.R.

REGIRDERING A BIG INDIAN BRIDGE

In the new spans of the Nerbada bridge at Mortakka, B.B. & C.I.R., the rails are fastened directly to the trough decking, thus eliminating sleepers, stringers, lateral bracing, and also all secondary transverse stresses in the girder chords and web, and reducing impact by a third; there are also many other novel features

A CONTRACT for the regirdering of the last bridge in the Bombay, Baroda & Central India Railway bridge-strengthening programme, which was initiated about 19 years ago, has recently been let to the Braithwaite, Burn & Jessop Construction Co. Ltd. of Calcutta. This bridge is over the Nerbada river at Mortakka on the metre-gauge section between Mhow and Khandwa; the existing structure consists of 14 main spans of 189 ft. and two plate girder shore spans. The track is carried on the top chords and a highway on a deck between the lower chords. The new structure will consist of 14 spans each of 193 ft. 10 in. (effective) with two plate girder shore spans of 37 ft. 6 in. without a highway deck. Arrangements are being made by the Holkar and Central Provinces Governments jointly to build a submersible road bridge not far from the existing railway bridge, so as to preserve the long-established road crossing of the river at this point.

The new spans were designed by Dr. H. J. Nichols, D.Sc., M.Inst.C.E., Bridge Engineer of the B.B. & C.I.R., and embody a number of new features of economic importance, many of them introduced as a result of extensive investigations into secondary and deformation stresses—covering about 40,000 stress readings—which were carried out in 1934-35 on girders of the Silver Jubilee bridge at Broach. For instance, there is a trough floor supported on the top chords, to which the rails, welded into continuous lengths over each span, are keyed direct, thus eliminating timber sleepers and their costly maintenance. It has further been demonstrated by experiments on this type of floor, used in the recently completed Ravine viaduct bridge, that impact is reduced to about ⅔ of the usual figure, and secondary stresses in a transverse plane are completely eliminated from the supporting chords and from the web members. The usual cross girders, stringers and lateral bracings are omitted, a substantial saving in steelwork being thus effected.



Left: Diagram (a) is a typical example of the normal design of web verticals, and (b) shows the general arrangement of the design as modified, following the Broach investigations
Right: Diagram indicating method of substituting welded flush-battens for more usual riveted lacing bars

One of the accompanying illustrations shows this type of floor in its finished condition, with all troughs filled level with a special lightweight bitumen compound, weighing 44 lb. to the cu. ft. Continuous support is afforded to derailed wheels, and complete protection against corrosion is assured. Incidentally, an exceptionally smooth running track is obtained, which remains in perfect adjustment throughout the life of the bridge and should require no attention from year to year.

A second feature of considerable interest is to be found in the web verticals. The Broach investigations indicated that, on account of the intrinsic stiffness of the web members as usually designed, the pre-stressing operations were only partly effective. In the new design, therefore, all web members have been rotated through 90 deg. about their own axes, as shown in the accompanying diagrams, so as to bring the battened surfaces into the plane of the truss, as in diagram (*b*).

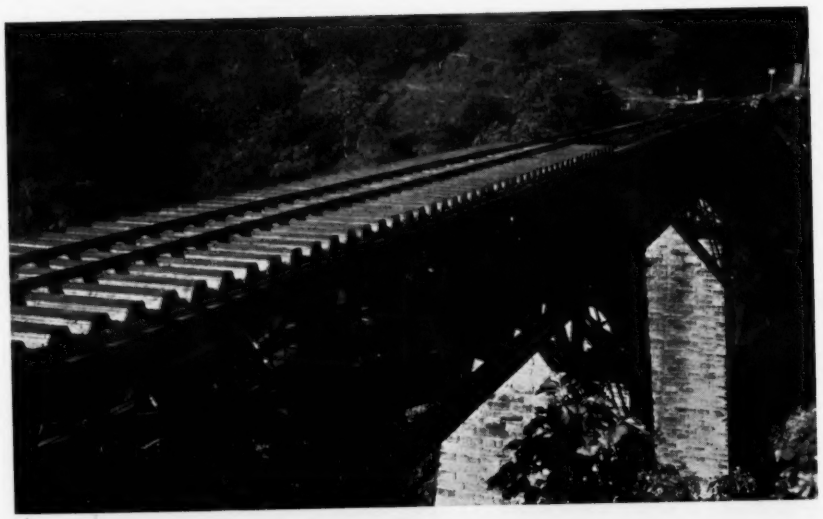
During erection, the batten plates are loosely attached by small bolts, and each member is assembled into the truss as two separate flanges, of very little lateral stiffness. The flexibility on the plane of the truss of the unbattened members facilitates pre-stressing, whereas the additional stiffness obtained in the transverse plane minimises racking distortion. After making good the end attachments under little or no stress, the flanges are connected by drifting up the batten systems, the battens and flanges having been drilled as for straight members.

For the first time in India welding has been used in the fabrication of railway spans of this type (open web), but all the field connections are riveted; a considerable volume of shop work has been simplified by the substitution of details designed for welding. In place of the almost universal riveted lacing bars, welded flush-battens have been substituted with considerable economies in material. A further advantage of this system is that there are no rivet holes to deduct from the effective section of the members, and the scantling of tension members may be decreased accordingly. Preliminary tests to destruction on half size members have demonstrated that these desirable features are realised in practice.

Further features of note are: (*a*) the use of high-tensile steel in the main chords (mild steel being used in the remainder of the spans); (*b*) full pre-stressing for dead load + live load + half impact, and interchangeable jig-manufacture; (*c*) rail track laid to the camber of the top chords approximating to a straight profile under full load conditions; and (*d*) welded rail lengths over each 194-ft. span with expansion joints of the Broach type over each pier. High-tensile steel rivets are to be used in all strength connections. The effects of impact are reduced by the provision of a wide trough deck, and the elimination of rail joints. It is hoped that stress measurements on these spans, when they come to be carried out, will demonstrate the soundness of increasing primary working stresses when special measures are taken to control secondary and deformation stresses. The work is expected to be completed by about October, 1941.

XUM

The Nerbada bridge at Mortakka as existing before reconstruction



Ravine viaduct bridge with new type of sleeperless trough flooring partly laid

Ravine viaduct bridge with flooring completed and trough filled with bitumen

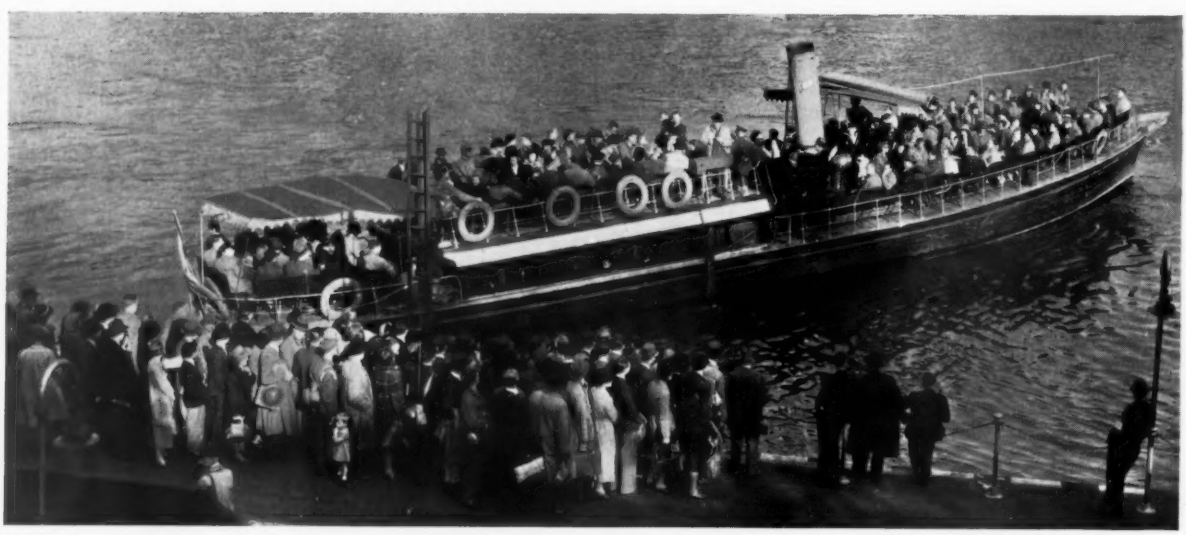
REGIRDERING A BIG INDIAN BRIDGE

(See article on opposite page)

British Railways and the War—38

Above : Mr. C. H. Newton, Chief General Manager, L.N.E.R., opening an improvised miniature rifle range for the Home Guard at Edinburgh Waverley station

Left : Platform scene at a London tube station, where many persons take tickets in the early evening for short journeys and then shelter for the night. (*See pages* 319 *and* 337)



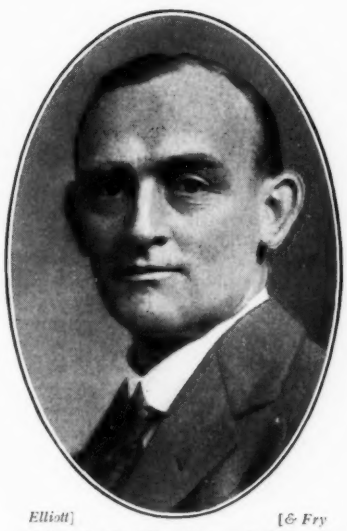
One of the many peacetime pleasure steamers now maintaining emergency passenger services between Westminster and Woolwich. (*See page* 317 *and last week's issue, page* 309)

RAILWAY NEWS SECTION

PERSONAL

Mr. E. J. Missenden, General Manager of the Southern Railway, has been appointed a Director of the East Kent Light Railways Company, in place of Mr. Gilbert S. Szlumper, who has retired from the board on becoming Railway Control Officer in the Ministry of Transport.

Mr. Charles Herbert Hamilton has been appointed Chairman of the South African Railways & Harbours Service Commission. He joined the service of the Natal Government Railways in 1902, later went to Bloemfontein, and in 1916 was transferred to the headquarters at Johannesburg. In 1921 he became Private Secretary to the then General Manager, Sir William Hoy, which position he held until 1927, when he was appointed Tourist Agent at Cape Town; in 1926 he accompanied Sir William Hoy to the Imperial Conference. In 1929 Mr. Hamilton was appointed Director of the Publicity & Travel Bureau in New York, and returned to South Africa in 1931 to the position of Operating Assistant at Cape Town. In 1932 he became Port Goods Superintendent at Port Elizabeth, and later in that year Goods & Passenger Superintendent at the same centre. In 1935 he was appointed Superintendent (Operating & Commercial), Kimberley, and in the next year Superintendent (Staff) General Manager's Office, Johannesburg. He returned to Kimberley in 1938 as System Manager, and in January, 1940, was transferred to Pretoria in the same capacity. Mr. Hamilton was recently seconded to the Defence Department as Director of Transportation with the rank of Lieutenant-Colonel, a position he still retains. In 1918 he was awarded the O.B.E. for services rendered as Honorary Organising Secretary of the railway "big push," by which effort an amount of £70,000 was raised for the Governor General's Fund.



Elliott [*& Fry*

Mr. C. H. Hamilton, O.B.E.

Appointed Chairman, South African Railways & Harbours Service Commission

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The Minister of Supply has appointed Mr. George Clement Jenks, J.P., Chairman & Managing Director of the British Tool & Engineering Co. Ltd., Wolverhampton, to be Director of Hand Tools in the Department of the Director General of Equipment & Stores.

Sir William Clark has been elected to the board of directors of the Southern Railway in place of the Rt. Hon. L. S. Amery, who is now Secretary of State for India. Sir William was the first Controller of the Department of Overseas Trade and left this position to become first British High Commissioner to Canada.

Mr. Charles Steane Louch, formerly Comptroller & Accountant to the London Passenger Transport Board, whose death on September 17 we recorded last week, joined the service of the Underground Electric Railways Co. of London Ltd. in 1902, as Accountant. Previously he had been with the British Thomson-Houston Co. Ltd. at Rugby, and severed his connection with that organisation at the time the "Underground" company was formed to take over the Metropolitan District Electric Traction Co. Ltd. and enlarge the scope of that organisation by constructing, equipping, and controlling a group of tube railways. In 1907 Mr. Louch became Accountant also of the Great Northern, Piccadilly & Brompton Railway, the Baker Street & Waterloo Railway Company, and the Charing Cross, Euston, & Hampstead Railway Company—the three tube railways then in the Underground group; they were merged in 1910 to form the London Electric Railway Company. In 1913 Mr. Louch received the further appointment of Accountant to the Metropolitan District Railway Company, and in 1914 of the Central London Railway Company, the City & South London Railway Company, and the London General Omnibus Co. Ltd., all of which had become members of the Underground group shortly before that time. Under the general reorganisation of this group of companies in 1921, Mr. Louch was appointed to the new office of Comptroller & Accountant, and, with the establishment in 1933 of the London Passenger Transport Board, he occupied a similar position in the board's service, from which he retired on January 31, 1939, after having completed over 36 years in the service of London transport. At that time he was the recipient of an official farewell and a presentation from a meeting of the railway companies' accountants when Mr. A. Howie (then Joint Accountant, Southern Railway) expressed regret that the passing of time had brought with it the official severance of Mr. Louch from his railway friends, who would always retain happy recollections of his many and outstanding qualities which had endeared him to all his colleagues of the main-line railway companies. Cremation took place at Streatham Park Crematorium on Friday last (September 20).

Howard [*Coster*

The late Mr. C. S. Louch

Comptroller & Accountant, London Passenger Transport Board, 1933–1939

Sir Amin Osman Pasha, K.B.E., has accepted a seat on the local board of the Egyptian Delta Light Railways. Lt.-Colonel J. R. Marryat, D.S.O., M.C., R.E., Agent & General Manager, has rejoined the Army, and Mr. A. W. Bailey, Assistant General Manager, has been appointed Acting Agent & General Manager, during Colonel Marryat's absence on Active Service.

Mr. George H. Jenkins, General Fuel Agent of the Canadian National Railways, entered his 51st year of consecutive service with the system during the last week of August. All of his service has been in Montreal, and he has worked under seven presidents. Mr. Jenkins joined the Grand Trunk Railway at the age of 13 and became an apprentice clerk in the Car Mileage Department. Later he transferred his apprenticeship to the Stores Department, and stayed

there until 1901 when he was appointed clerk in the Purchasing Department. In 1912 he was made Chief Clerk in the same department. He became Assistant to the General Purchasing Agent in 1913. When the Grand Trunk was amalgamated with the Canadian National Railways in 1923, Mr. Jenkins was appointed General Fuel Agent of the National system, the position he now holds. Members of the fuel department staff have shown their appreciation of Mr. Jenkins's long service by presenting him with a cheque.

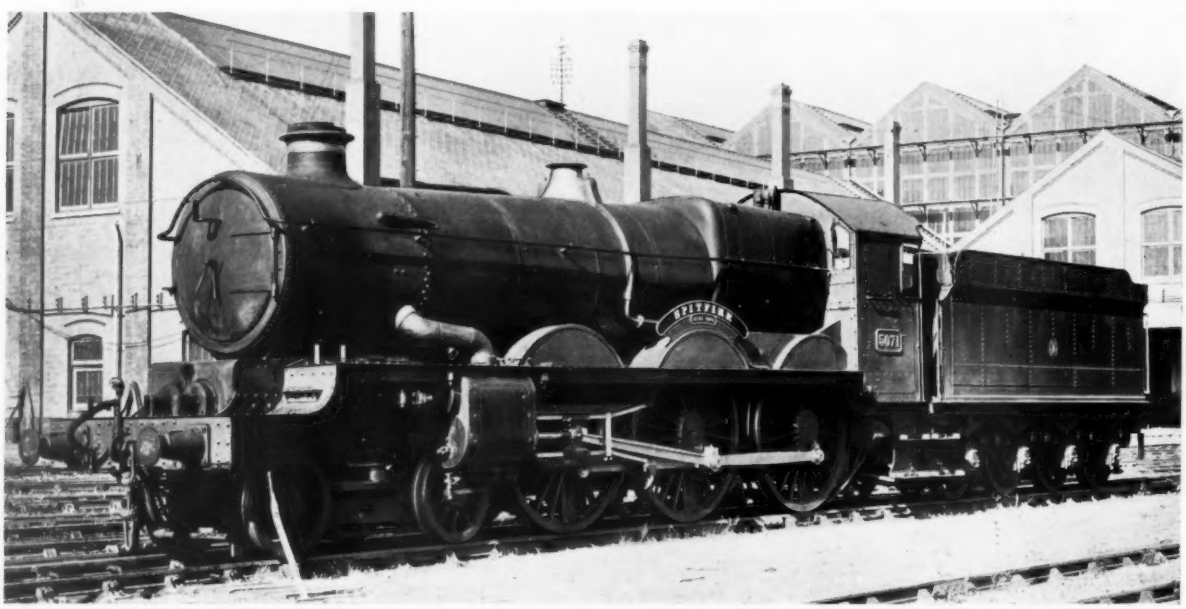
We regret to record the death on August 28 of Mr. Charles B. Hibbard who was successively Manager of the Sherbrooke (Quebec) Street Railway, and of the Quebec, Montreal & Southern Railway. Mr. Hibbard, who was 82 years of age, was for over half a century a railway official. He began his railway career in the United States where he worked on the railways of the middle west. He returned to Canada to join the New York & Ottawa Railway, then under construction, and later became Manager of the Sherbrooke Street Railway and the Quebec, Montreal & Southern Railway.

Mr. Ivor Fraser, Principal Officer (Special Duties), Chairman's Office, London Passenger Transport Board, has been appointed Director of Home Affairs, a newly-created position at the Ministry of Information. Mr. Fraser joined the staff of the Underground Electric Railways Co. of London Ltd., in 1910. After the last war he became General Manager of the *Morning Post*. He entered the service of the London Passenger Transport Board in 1937 and worked in close association with Mr. Frank Pick. Mr. Fraser was Chief Commercial Officer of the board until last May, when he was made Principal Officer for Special Duties attached to the Chairman's Office.

Herr Hans Etter retired from the post of President of the General Administration of the Swiss Federal Railways on June 30, on reaching the age limit. Herr Etter had wished to retire at the end of last year but the Swiss Government requested him to remain, in view of the serious international situation. He entered railway engineering work in 1899, joined the Gotthard Railway in 1902, and became District Engineer at Goldau in 1910, by which time the line had passed to the Confederation. In 1916 he was transferred to the General Offices at Berne. In 1922 he became Manager of what was then the 5th Division at Lucerne and in 1926 General Manager at Berne. In 1938 he took up the position from which he has just retired. Herr Etter was a member of the Permanent Commission of the International Railway Congress Association.

Dr. W. Meile has succeeded Herr Etter as President of the General Administration of the Swiss Federal Railways. Dr. Meile was born in the Canton of St. Gall and was educated at Fribourg, Berlin, and Munich. He was Secretary from 1913 to 1916 of the Swiss Association for Rhine Transport, after which he edited an export journal for twelve months and then became Chairman of the Basle Samples Fair, an important industrial association which he directed for 10 years. In January, 1938, he accepted a seat on the Board of Management of the Swiss Federal Railways, assuming charge over the commercial and legal sections.

The Federal Council has nominated Herr Paul Kradolfer to take the place vacated by Dr. Meile. Herr Kradolfer is 49 years old and is a native of the Canton of Thurgau. He was trained in railway engineering at Zurich University, and spent many years in Italy on railway construction and other engineering work and designed the bridges for the electric line running into the little Republic of San Marino. He practised as a consulting engineer in Switzerland from 1928 until 1932, when he took up a position in the engineering department of the Federal Railways. In 1936 he became head of the special Federal Transport Bureau which had to deal with general economic and other questions.



Number	New Name	Former Name
5071	"Spitfire"	"Clifford Castle"
5072	"Hurricane"	"Compton Castle"
5073	"Blenheim"	"Cranbrook Castle"
5074	"Hampden"	"Denbigh Castle"
5075	"Wellington"	"Devizes Castle"
5076	"Gladiator"	"Drysllwyn Castle"

Number	New Name	Former Name
5077	"Fairey Battle"	"Eastnor Castle"
5078	"Beaufort"	"Lamphey Castle"
5079	"Lysander"	"Lydford Castle"
5080	"Defiant"	"Ogmore Castle"
5081	"Lockheed Hudson"	"Penrice Castle"
5082	"Swordfish"	"Powis Castle"

The G.W.R. locomotive, No. 5071, formerly "Clifford Castle," which has now been renamed "Spitfire". We recorded in our issue of August 30 the decision of the G.W.R. to rename "Castle" class locomotives after well-known aircraft; ten were announced in the original list and it will now be noticed that 12 are at present included

TRANSPORT SERVICES AND THE WAR—57

London tube stations as air raid shelters—Week-end visits to evacuees—Manchester airport—Merseyside tunnel and ferries—R.A.F. attacks on enemy communications—Barrage balloons disorganise Swedish transport

Once more London has experienced a week of nightly aerial bombardment, and considerable prominence has been given to the demand for additional public shelter accommodation—and especially deep-level shelters—so that members of the general public may be able to take cushions, etc., and settle for the whole night. In the early days of the war, the London Passenger Transport Board issued a poster instruction (reproduced at page 494 of our October 13, 1939, issue) in the following terms:—

WAR EMERGENCY

UNDERGROUND STATIONS
MUST NOT
BE USED AS
AIR RAID SHELTERS

The public are informed that in order to operate the Railways for essential movement, Underground Stations cannot be used as air raid shelters. In any event a number of stations would have to be cleared for safety in certain contingencies.

Until recently this order has been enforced, and only *bona fide* passengers have been admitted to Underground stations during the progress of an air raid. About a fortnight ago, however, the urgent desire of many persons to take shelter in deep-level tube stations resulted in large numbers booking tickets for short journeys at the beginning of an air raid, or shortly before the sirens for the night raid were sounded, and then refusing to leave the railway premises. There are obvious practical and humanitarian difficulties about securing police co-operation to eject large numbers of persons into the open street during the progress of an air raid, and especially when the anti-aircraft barrage is " up," and accordingly the London Transport authorities—although officially not modifying the attitude, publicly adopted at the outbreak of war, and based on considerations of both expediency and safety—have since taken all practicable steps to meet the situation forced upon them, and made " compromise " arrangements to meet the needs of both shelterers and travellers. Thus, station staffs remain on duty throughout the period that shelterers are on the premises; essential lighting is left on; and, during the continuance of traffic, reasonable passage is kept clear for the benefit of travellers. In any event it should be emphasised that every shelterer is a passenger inasmuch as he must be a holder of a railway ticket, for non-ticket holders are rigidly excluded. Thus the present situation may be regarded as a very broad interpretation of the practice of admitting only passengers and then not ejecting passengers during the progress of the raid.

On September 18 the Ministries of Home Security and Transport made the following announcement: " The facilities provided by the tubes are of vital importance to London's transport and particularly so in these days. An urgent appeal is therefore made to the good sense of the public and particularly to able-bodied men to refrain from using tube stations as air raid shelters, except in case of urgent necessity. The whole problem is now being reviewed by the authorities concerned with a view to seeing whether some practical plan can be evolved for providing a measure of shelter outside rush hours which will not impair the essential use of the tubes for traffic purposes. The problem is however a very difficult one particularly since, at the rush hours which extend to 8 p.m., the whole of the available space is required for traffic purposes."

On the evenings of September 19 and 20 Sir John Anderson (the Minister of Home Security) and Lord Ashfield (Chairman of the London Passenger Transport Board) visited Holborn station to secure first-hand knowledge of the position of " passengers " who sheltered for the night. In addition, the Ministries of Transport and Home Security and the London Passenger Transport Board posted observers at various points and also received reports from the police about the use of tube railway stations as dormitories. The reports indicated that there was no trouble of any kind and remarked that members of the public should be allowed to continue to act as heretofore. Police were posted at tube station entrances and on the platforms to see that train services were not impeded, and the numbers allowed to remain at any one station are left to the discretion of the police and the station officials. By the night of Sunday last (September 22) conditions were even more considerably improved. While trains were running the police kept a 6 ft. space clear on the platforms for alighting passengers, but after the trains ceased running no objection was raised to persons sleeping on any part of the platforms until the train services began the next morning. Another improvement that evening was the establishment of continuous touch between the police on the stations all along the lines. When any one station became too congested, those who had sought shelter were put on trains and taken to less crowded stations. Everywhere complete order prevailed. A platform scene is shown in the photograph we reproduce at page 334. A further improvement beginning on Sunday night was the provision of very much better sanitary arrangements than heretofore. As tube railways and their platforms are below main drainage level, direct access to sewers is impracticable, and chemical sanitation is being adopted, similar to that used in large public shelters.

Aldwych Branch as a Shelter

Apart altogether from the use of tube stations as dormitory air raid shelters, one result of the visits of Lord Ashfield and Sir John Anderson to Holborn tube station last week was the brief official announcement made by the London Passenger Transport Board that the Aldwych branch of the Piccadilly Line would be closed after the last train on Saturday night, September 21. This branch, which is 573 yards long (nearly one-third of a mile) was intended to be part of the original main line of the Great Northern & Strand Railway, but due to changes effected in the London tube structure by the late Mr. Charles Tyson Yerkes—brief details of which are given in an editorial at page 320—the section between Holborn and Aldwych (until May 9, 1915, called Strand) emerged as a comparatively unimportant branch, and has been so ever since its opening on November 30, 1907. Twin tunnels were built and are still available, but of recent years a shuttle service has been maintained in one tube only. Since the closing last Saturday, steps have been taken to equip the Aldwych branch as a deep-level public air raid shelter.

Air Raid Shelter in Derelict London Tube

The formal opening on June 24 of the Southwark Borough Council air raid shelter established in a portion of the derelict City & South London Railway tube tunnels running under the Borough was recorded at page 904 of our June 28 issue. By a coincidence there was an air raid warning in the London area during the night of June 24-25, and many of the local residents used the shelter within 24 hours of the time it became available. We now understand that many families are sleeping every night in this shelter.

The Railways and Air Attacks

During the past ten days, says a statement issued by the Railway Executive Committee on September 18, the railways in the London area, in common with other undertakings, suffered damage. The courage and determination of both officers and railwaymen are worthy of the highest praise. Drivers, firemen, motormen, platelayers, gangers, signalmen, and other grades of the railway staffs have risen enthusiastically to the occasion with wholehearted devotion to duty. Ceaselessly by day and night the operating staffs

of the main-line railways and London Transport are arranging emergency services by railway, road, and river steamers to carry the public to and from their work. The work of repairing the damage is being unceasingly carried out by the railway engineering staffs who are always at the alert for instant action. One of the most outstanding features is the speed with which the repair squads are on the scene immediately after a bomb explodes, and the rapidity with which they complete the repair. Among the problems which are being tackled are the putting out of fires caused by bombing; the clearance of great quantities of debris from the lines; the filling up of bomb craters and relaying the tracks; the introduction of emergency signalling systems pending the repair of the permanent installations; repair of damaged electric cables; inspection of arches of bridges and tunnels; and overcoming the difficulties of unexploded bombs on sections of line.

Innumerable instances of fine work on the part of railway staffs can be given, says the statement. For instance, four bombs fell on a suburban line at 1.30 p.m. blocking three lines. By 3.15 p.m. two lines had been opened for traffic. At a terminal station bombs damaged the station roof and platforms, killing the driver of a train and seriously injuring two firemen, and putting the signalling system out of operation. Regardless of this the trains were still kept running. A complicated junction near a large station was bombed at 4 p.m., but before 6.30 p.m. the whole of the lines, points, and signalling had been examined and repairs were made in time to cope with the bulk of the evening business traffic. Bombs were dropped at midnight on a suburban station dealing with very heavy passenger traffic, but in less than two hours repairs had been carried out, a damaged empty train was removed, and early morning passengers were passing through the station. An incendiary bomb recently hit a suburban train setting it on fire, and the guard's log read "train fired by enemy bomb, fire extinguished *en route*, passengers behaved splendidly, little delay."

Women Porters in London Transport Service

On the morning of September 17, 19 women porters who have taken the place of men called up for Military Service began duty at London underground stations.

Week-end Visits to Evacuees

The Minister of Transport has announced that in the present circumstances it will not be possible to continue to run the special trains at week-ends for visits to evacuees. The cheap facilities will, however, still be available on the ordinary services on which they are now available.

Manchester (Barton) Customs Airport

The Air Minister announced on September 15 that Manchester (Barton) airport has been approved as a customs aerodrome. It will be recalled that on page 157 of our issue of August 9 the transfer to Manchester (Barton) from Liverpool (Speke) on August 5 of the terminus of the Irish Channel airways was recorded.

Merseyside Tunnel and Ferries

By order of the Military Authorities, the rule closing the Mersey tunnel during a raid warning between 7 a.m. and 7 p.m. has not operated since Saturday, September 14. The ban on traffic through the tunnel continues in the event of a warning during the night hours, and the day position is under constant review.

The Corporation of Wallasey, on the Cheshire side of the river from Liverpool, received a ready response from an appeal which it issued to its motorbus and ferryboat employees to carry on after a warning.

Help for the Homeless

The Minister of Health (Mr. Malcolm MacDonald) has sent to the local authorities in the Greater London area, for display in emergency rest centres and for local distribution, a summary of the various forms of help available for persons who have to leave their homes as a result of air raid damage. Primarily, arrangements consist of temporary provision at rest centres until other and more permanent arrangements can be made. Transport facilities, however, to more distant points are available in certain cases. In particular, if the homeless ones have relatives or friends who can give them shelter but are unable to reach such homes without help, an officer of the Public Assistance Authority is authorised to issue a travel voucher.

Cheap Fares in South Africa for British Navy

It is reported from Pretoria that arrangements have now been made whereby members of the British Navy in ships calling at South African naval stations will be given return tickets to any part of South Africa at special concession rates little more than a quarter of the ordinary passenger fare.

Financial Assistance by the Kenya & Uganda Railways

According to *The Times*, the Kenya & Uganda (Government) Railways have decided not only to reduce still further the rates charged for all forms of military transport, but also to offer—with the approval of the Secretary of State for the Colonies—a gift of £500,000 to the war costs of East Africa. This gift will probably take the form of free military transport up to £250,000 in value during the current year, and a similar sum next year.

Indian Railways and A.R.P.

The entry of Italy into the war has brought western India within the possibility, however remote, of enemy attack from the air, and the Indian railways, along with a host of official and non-official bodies, have organised elaborate air raid precautions. On most of the railways many members of the staff have been fully trained to render first aid and to fight fires. These will naturally be drawn upon to form railway A.R.P. squads. The railway telephone system provides a facility for railway A.R.P. work not enjoyed by other organisations.

The Great Indian Peninsula Railway has put up a loud speaker equipment at Victoria terminus, Bombay, from which it will be possible to tell the travelling public what to do and where to go if an air raid occurs. This equipment can also be used in normal times to give information about the running of trains. Already it is used for air raid practices, and, as large crowds flock to the loud speakers, advantage is taken of these gatherings to deliver short A.R.P. lectures. Notices in several languages are also posted in all suburban trains, giving simple advice to passengers about what they should do when an air raid warning is given.

It may be remembered that, at page 304 in our issue of March 1 last, we illustrated different types of signal lamp hoods fitted as A.R.P. at Karachi on the North Western Railway, India.

All-the-Year Summer Time in Canada

The Federal Cabinet has passed an Order in Council decreeing that all communities in Canada which have worked to daylight saving time during the past summer shall continue thus indefinitely. According to *The Times* Ottawa correspondent, the decision has been taken on the recommendation of the Federal Controller of electric power with the approval of the Hydro-Electric Commission of Ontario and the private power companies of Quebec, two provinces where the demands of war industries are already straining the power resources. The objective is to conserve electric energy for industrial use by reducing the consumption for lighting. It is estimated that 189,000 h.p. a day will be released for industrial power.

Railway Time in Switzerland

Now that Germany has adopted summer time as a wartime measure, not only in her own country but also in invaded territories, Switzerland occupies an exceptional position in continuing to use normal Central European Time. The clock on the Reichsbahn station in Basle is set to German time, however, and in response to the request of the local Swiss authorities that this be altered to Swiss time, the Germans pointed out that the clock was intended for travellers using German trains which run to the German timetable. The station itself, although on Swiss soil, is leased to Germany.

Lithuanian Border Restrictions

It is reported from Stockholm that since August 20 the Soviet authorities in Lithuania have prohibited all access to a zone seven miles wide along the German-Lithuanian frontier. Restrictions apply to a 20-mile zone along the whole frontier of Lithuania, and strict control is exercised over all residents and visitors.

R.A.F. Attacks on Enemy Communications

Reference has been made in THE RAILWAY GAZETTE on a number of occasions to the vital part which means of communication, and especially railways, are playing in the conduct of the war. From time to time details have been given, as they have become available for publication, of the disruption which has been caused to the full flow of transport by attacks on vital lines of communication. During the rapidly moving battles in France, Belgium, and Holland, railway junctions, main-lines, bridges, and viaducts, canals, and roads became objectives of high military importance and considerable damage was done to all of these by both the Allied and enemy Forces, more particularly by bombardment from the air. Since the evacuation of the British Expeditionary Force from the Continent, and the capitulation of France, air attack has been the only direct means open to us to harass the enemy through his communications. That the importance of so doing is fully appreciated by the High Command, and the thorough and systematic manner in which the R.A.F. has conducted this part of the war, are apparent from a study of the daily bulletins issued by the Air Ministry.

Since May, when nightly bombing raids over Germany and enemy-occupied territory became a matter of routine for the R.A.F., there have been very few occasions when the preselected targets have not included railway marshalling yards, junctions, sidings, or main-lines. So frequently has the important Hamm marshalling yard been bombed, that it is now mentioned only casually in the bulletins, generally in some such phrase as " the marshalling yard at Hamm was attacked as usual." By August 16 Hamm had been bombed fifty times ; in THE RAILWAY GAZETTE of September 6, when a short illustrated description of the yard was published giving details of its working and its importance in the movement of traffic to and from the industrial area of the Ruhr, it was recorded that the sixtieth bombardment had taken place. The number now is over seventy. The constant repetition of the attacks has been necessary because of the comparative ease with which repairs can be effected to targets of this kind and also because of the effective results which are obtained from the destruction of the massed traffics in the yard.

Although Hamm has found prime favour with R.A.F. pilots, other similar railway centres have no reason to feel neglected. Soest, an important junction to the east of Dortmund, has received attention second in regularity only to Hamm. Some thirty attacks have been specifically mentioned since June 3 and on a number of other occasions the wording of the bulletins has suggested that Soest was among the targets. On July 14 the Air Ministry stated that when one pilot arrived over Soest he found that fires already started were so great that he considered it was not worth a further attack. He therefore flew on to Lippstadt, where he scored three direct hits on the railway junction with high-explosive bombs. Osnabruck has been an object of constant attack as also has been Schwerte, south of Dortmund. The former has figured in the bulletins well over a dozen times and the latter almost as frequently. Marshalling yards near Essen, Duren, Enskirchen, and Osterfeld, have been bombed with both high explosives and incendiaries. Gelsenkirchen, where there are large oil supply depots, has also been visited many times, and during the present month Ehrang and Krefeld have been targets on a number of occasions.

Aachen is another centre which has become familiar to our airmen. There the marshalling yard and junctions have been frequently attacked and many hits registered. It was recently reported that south of Aachen the main line had been blocked by the collapse of one end of a tunnel which had been hit repeatedly. At Vise, 15 miles to the west of Aachen, the Air Ministry stated on June 9 that a tunnel was blocked and a bridge destroyed. At Cologne a railway junction has been attacked on several occasions, and Mannheim, Dusseldorf, Bremen, Homberg, and Rheydt are among other centres which have been visited on more than one occasion. On September 23 the R.A.F. thrust well into Saxony and bombed the important aluminium works at Laute, north-east of Dresden ; railways were attacked at several points in this neighbourhood.

In German-occupied France a great deal of damage to communications had been done before the withdrawal from the war of the Pétain administration. Since then British and Allied air activity over France has been designed to hinder movement of enemy traffic towards the coast and to destroy armaments and stores in transit. At Soissons the railway and roads have been attacked often, and the junctions at Chateau Thierry and Laon have been reported as heavily damaged.

The road system of Germany has not been overlooked by those responsible for the direction of the activities of the R.A.F., and the bombing of certain of the modern motor-roads has been mentioned a number of times in the bulletins. Details are not given, however, which enable specific identification to be made of the stretch of roadway affected. Inland waterways, which on the Continent are of far greater importance and are used much more intensively than in this country, have frequently formed targets. The Dortmund-Ems canal, one of Germany's main arteries for water-borne traffic, has been most frequently attacked and much damage, especially to lock-gates, has been reported. Many barges have been destroyed. It was announced on September 20 that a successful attack had been made on the aqueducts which carry the canal across the River Ems. Repair gangs had been working at high pressure to make good damage caused by previous raids. On this occasion direct hits were observed on the aqueducts. The canal basin at Duisberg-Ruhrort has suffered from attack and it was stated on June 28 that when barges on a canal five miles north of Riesenbech were bombed one was blown out of the water. On the same night inland docks near Duisberg were attacked. On August 20 a low-level attack was made on the Weser-Elde Canal and a line of bombs was seen to straddle an important bridge. In Holland the canal system has been subjected to R.A.F. visits and among the waterways specifically mentioned have been those at Zwolle, Haten, and Weest, others near Elberg and Delft, and between Veere and Middelburg. The Verbreed canal was subjected to a heavy attack on September 20 ; a few days earlier at Veere, on the Dutch island of Walcheren, a concentration of barges in a canal lock had been bombed from a low level.

In THE RAILWAY GAZETTE last week some details were given of attacks which had been made by the R.A.F. on Berlin and the bombing which had taken place of the Potsdamer and Anhalter railway stations and nearby yards. Further attacks have been made on the capital and on the night of September 23-24 our aircraft heavily bombed Rangsdorf station and several goods yards including that at Grunewald. Among the heaviest attacks were those on railway yards near the Potsdamer and Lehrter stations. Yards at Charlottenburg were also seen to be hit.

Barrage Balloons Disorganise Swedish Transport

According to a message from *The Times* correspondent in Stockholm, dozens of barrage balloons, reported to be British, drifted over southern and western Sweden on September 17 and 18, and travelled as far across the country as Stockholm. The trailing steel cables are said to have caused considerable damage to transport and to electricity supply. *The Times* message, which is dated September 18, added that " the electric train service in west Sweden was interrupted in at least seven places last night, when balloon cables short-circuited the high-tension lines and finally virtually paralysed railway communications, which are mainly electrified." The principal main lines of the Swedish State Railways, as well as that of the most important privately-owned railway (the Bergslagen Railways), are electrified on the 16,000-volt single-phase system. The overhead conductors as well as the high-tension transmission lines would be vulnerable to short-circuiting by the balloon cables. It is said that the tramcars were stopped at Gothenburg, and also at Copenhagen (on September 17), thus bringing Denmark within the scope of the damage.

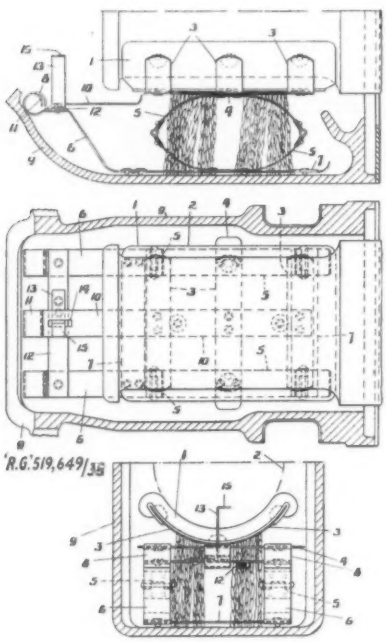
XUM

ABSTRACTS OF RECENT PATENTS*

No. 519,649. Axle Lubricators

Ernest Mooney and Anthony Mooney, both of Lendal Bridge, York. (*Application date: September* 27, 1938.)

The lubricator consists of a pad 1 against the axle journal 2 and secured to a flexible frame 3 mounted on a strip 4, whereby it is attached to springs 5 which are connected to side members 6 of a flexible base frame. Transverse strips 7 complete this frame. The members 6 have extensions with looped ends 8 for finger holds to facilitate removal of the lubricator from axle box 9. So that the frame 3 may be depressed clear of the journal 2, it has an extension 10 with a finger hold end 11. Connecting the extensions of

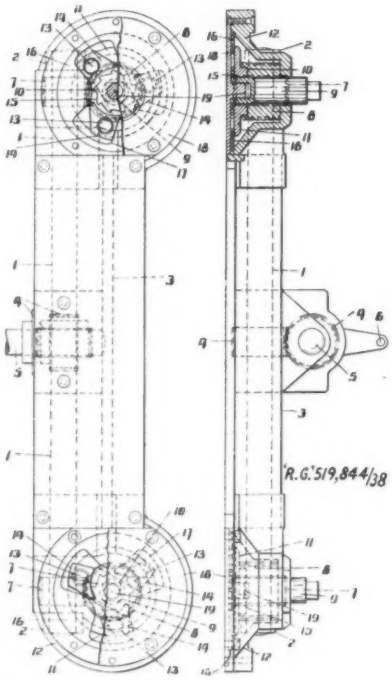


members 6 is a strip 12 with a central vertical member 13 passing through hole 14 in extension 10. A head 15 on the strip 12 serves as a stop to limit movement of this extension.—(*Accepted April* 2, 1940.)

No. 519,844. Route or Destination Indicators

Albert Fieldhouse Kellett, of 24, *York Place, Leeds,* 1, *and George Hays, of "Haysleigh," King Lane, Alwoodley, Leeds.* (*Application date: October* 1, 1938.)

The winding gear of the indicator consists of a common actuating shaft 1

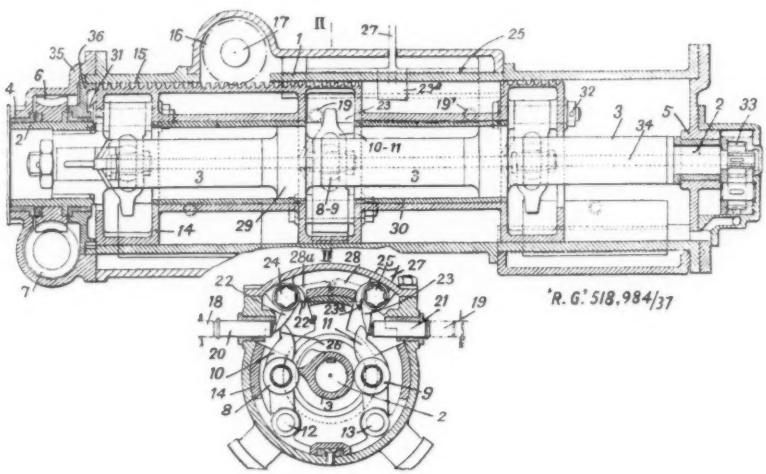


in bearings 2 in the casing 3, the shaft being rotatable by helical gearing 4, shaft 5 and handle 6. On each end of shaft 1 is a helical gear 7 meshing with pinion 8 revolvably mounted on a shaft 9 from which the drive of the associated blind roller is taken. Each pinion 8 has connected to it, by a key 10, a disc 11 rotatably mounted in a housing 12, this disc having pins 13 each carrying a pawl 14. These pawls are controlled by a rotary disc 16 which has a central hole to accommodate a ratchet wheel 15, and slots 17 to accommodate the pawls. A cover plate 18 fractionally restrains rotation of disc 16 so as to ensure correct action of the pawls, and is provided with a pin 19 constituting a spigot bearing for ratchet wheel 15 and shaft 9. This arrangement is such that, according to the direction of winding, one roller is positively driven, whilst the other is rotated by the pull of the blind.—(*Accepted April* 8, 1940.)

No. 518,984. Steam Valve Gear

Société d'Exploitation des Procédés Dabeg, of 45, *Avenue Kleber, Paris XVI, France.* (*Convention date: September* 10, 1937.)

In this valve gear the levers 10, 11, which are pivoted at 12, 13 or 31, 32 on a slidable carrier 14 and transmit motion to the distribution valves through stems 18, 19, are movable along rotary cams 3 carried on shaft 2 mounted in bearings 4, 5 in casing 1. Pivoted levers 22, 23 on shafts 24, 25 are inserted between the levers 10, 11 and the valve push rods 20, 21. Operation of shaft 2 is effected by a driving wheel of the locomotive through worm 7 and wheel 6, and the speed of rotation of cams 3 corresponds to the speed of the locomotive. Fitted on levers 10, 11 are rollers 8, 9 which rotate on the cams 3, and these latter, together with shaft 2, have guiding journals 29 in a sleeve 30 provided in carrier 14. A rack 15 and pinion 16 on shaft 17 operate carrier 14. In order to produce rolling contact when the cams rotate



the levers 22, 23 have a gear tooth profile 26, and, to keep the inlet valves in the open position when running down an incline, for example, fingers 22*a*, 23*a* are provided, these being operable by lever 27 and rigidly connected to inter-meshing toothed sectors 28*a*, 28. Lubrication is effected by a geared pump 33 which forces oil through the hollow centre 34 of shaft 2. The end plates 35, 36 may be re-

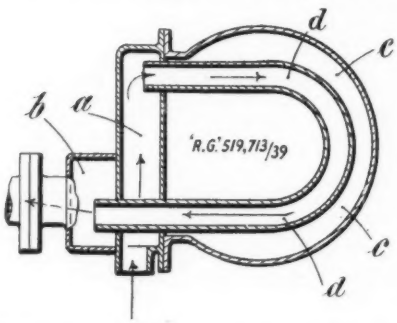
* These abridgments of recently published specifications are specially compiled for THE RAILWAY GAZETTE by permission of the Controller of His Majesty's Stationery Office. Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet as issued, on payment of a subscription of 5s. a group volume, or in bound volumes, price 2s. each, and the full specifications can be obtained from the same address price 1s. each.

moved when it is desired to inspect the working parts.—(*Accepted March* 13, 1940.)

No. 519,713. Boilers

Wauchope Leslie George, Cyril Terence Delaney, and Gallay Limited, of Edgware Road, Cricklewood, London, N.W.2. (*Application date: March* 28, 1939.)

When steam is generated by the engine exhaust or other similar source of heat *c*, curved tubes *d* are provided

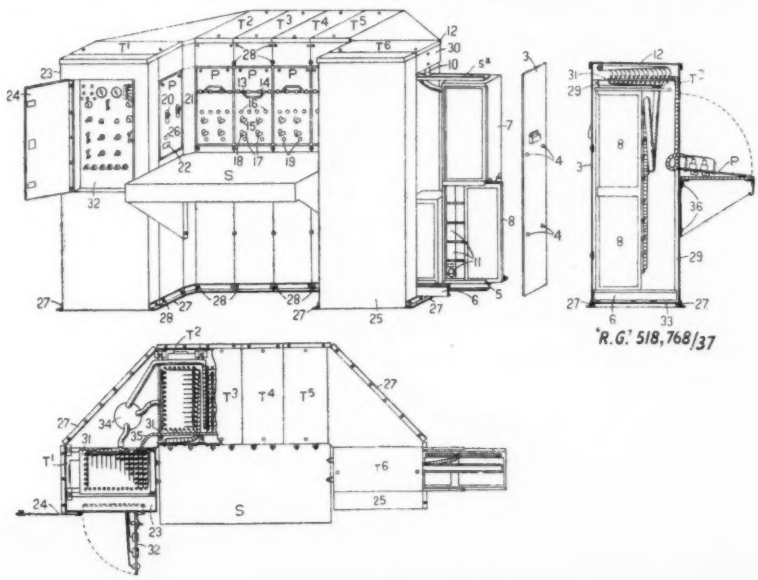


between the header tank *a* and header tank *b* containing the heated fluid or vapour. The fluid or vapour to be heated flows through the tubes *d* which may be curved or coiled but always ultimately bend downwards so as to pass through the header tank *a* into the other header tank *b*. By this construction the joints between tubes *d* and header tanks *a* and *b* are all subjected to the flow of cooler fluid.—(*Accepted April* 3, 1940.)

No. 518,768. Controls

General Railway Signal Company, of Rochester, New York, assignees of Joseph Fred Merkel, of 1222, *Genesee Park Blvd., Rochester, New York.* (*Convention date: October* 16, 1937.)

Remote control apparatus for points and signals is collected into units T-T^6 about a shelf *S*, and the point and signal operation levers 15, 17 are mounted on panels *P* which can be moved to give access to the back of the apparatus. To this end the relays 11 and terminals 31 are arranged in flexible cable. There is a track diagram 13 extending across the panels *P* and having indicator lamps 14, and there are signal lamps 16. The relays 11 are carried in structures 7 on frames 8, slidable in their respective units, and channel members 5*a* slidable on bars 10. There is also a test panel 32 in a cabinet 23 having a door 24, and this panel can be opened outward on hinges.—(*Accepted March* 7, 1940.)



COMPLETE SPECIFICATIONS ACCEPTED

516,436. Taylor, T. Driving-gear for locomotives and other vehicles and engines.

516,576. Vereinigte Eisenbahn-Signal-Werke Ges. Electric interlocking systems for railway signalling purposes.

516,654. Tovarosi Fischer, G. Automatic lubricator for the current collector of an electric vehicle.

516,676. Brockhouse & Co. Ltd., J., and Dear, A. T. C. Coupling for vehicles.

516,682. Chapman, A. W. Adjustable seats, especially vehicle seats.

516,800. Standard Telephones & Cables Limited, Griffiths, J. B., and Brown, A. Railway signal and/or points control equipment.

516,841. Evershed & Vignoles Limited and Marchment, W. T. Electric signalling systems.

516,884. London & North Eastern Railway Company and Cruddas, T. H. W. Axle-boxes for railway vehicles.

516,947. Boardman, H. Remote-control system for stopping a steam engine.

517,051. Schoor, M. C. Van. Train-token machine for the control of trains and like vehicles between stations.

517,156. Lamont, J. H., and Lamont & Co. Ltd., J. H. Pipe coupling devices.

517,240. Baker, W. S. Graff-, and London Passenger Transport Board. Railway carriages and the like.

517,275. Maley, A. W., and Taunton, E. M. Sanding-apparatus on rail vehicles.

517,439. Castagna, F. Railway and like rails.

517,518. Burns, J. S. Electrically-operated railway or tramway points-shifting mechanism.

517,520. Iddon Bros. Ltd. and Ratcliffe, J. Glands for steam-heated vessels and the like.

517,545. Kohle-und Eisenforschung Ges. Production of railway rails, wheel rims, sheet piling, and the like.

517,552. O'Leary, P., and Sharkey, W. Steam valves for revolving-cylinder steam engines.

517,569. Cotchett, J. S. Hand trucks.

517,691. Westinghouse Brake & Signal Co. Ltd. Fluid-pressure braking apparatus for railway vehicles.

517,746. Pratt, J. H., Manley, G. E., and Girling, A. H. G. Hydraulic shock-absorbers.

517,766. Standard Telephones & Cables Limited, Griffiths, J. B., and Brown, A. Train-describing equipment.

517,898. Higgs, G. R., Gray, W. T., and Metropolitan-Vickers Electrical Co. Ltd. Electric traction-control equipments.

517,953. Giovannelli, I. Safety arrangements for railway traffic.

517,967. Standard Telephones & Cables Limited, Griffiths, J. B., Brown, A., and Tervet, E. J. Electric signalling systems for train-describing purposes.

517,968. Henderson, P. L. Electrical control apparatus for regulating the temperature of railway and other vehicles.

517,986. Firestone Tyre & Rubber Co. Ltd. Load-supporting and shock-absorbing devices.

517,988. Westinghouse Brake & Signal Co. Ltd., Venning, C. F. D., and Challis, E. W. Route setting or locking systems for railways and the like.

518,034. Butterley Co. Ltd., and Hogg, J. L. Buffers for pit trams, wagons, and the like.

518,251. Beyer, Peacock & Co. Ltd., and Jackson, S. Articulated locomotives and like vehicles.

518,296. Brooks, R., Whyman, F., and Metropolitan-Vickers Electrical Co. Ltd. Pantagraph current-collecting devices for electric railway vehicles.

518,358. Soc. Francaise des Munitions de Chasse de tir et de Guerre (Anciens Etablissements Gevelot et Gaupillat). Detonators for signalling purposes.

518,383. Asselin, J. H. Railway crossings.

518,387. Standard Telephones & Cables Limited, Griffiths, J. B., Brown, A., Martin, N. H., and Hellier, W. H. M. Railway-track control and indicating panels.

518,404. Sleigh, H. L., Cheston, A. S., and Oldham, F. A. M. Means for ventilating vehicles.

518,422. Westinghouse Brake & Signal Co. Ltd., Venning, C. F. D., and Proud, H. M. Route-setting systems for railways and the like.

518,482. Hurst, W. F. F. Martin-, and British Thermostat Co. Ltd. Valve for steam and other pressure vessels.

518,507. Royle, T. W., and McCallum, P. Ejecting means for ashes and like materials from enclosed spaces such as smoke boxes.

518,527. Southern Railway Company, Furnivall, S. L., and Haslett, T. H. Spring-operated crossings, catch points, trailing points, and the like, of the permanent way of railways and tramways.

518,638. Westinghouse Brake & Signal Co. Ltd., Kershaw, A. G., and Leech, K. H. Pressure-governor devices for compressors or exhausters supplying pressure or vacuum reservoirs.

XUM

NOTES AND NEWS

Swedish Railway Accident.—On September 17 two trains met in head-on collision outside Gothenburg Central station. Nine persons are reported to have been killed and 28 injured.

Another Scrap Survey.—The Minister of Supply announces a comprehensive national survey to assess and record all the larger sources of potential scrap metal in Great Britain. It will cover every condemned bridge and derelict building, and will include disused steel towers, mine and railway tracks, and every large structure now no longer in use, but which contains iron and steel. The survey is expected to reveal a large potential tonnage of material which can be taken into use when it is required.

S.R. Salvage.—Below we reproduce a design which has just been prepared by the Public Relations & Advertising Officer of the Southern Railway. It is issued both as a salvage poster and also as a notice, the former for display at stations to appeal to the public as well as to the staff, and the smaller bill for display in staff rooms only. The double royal poster has been varnished in order to lengthen the life of the display, and will be posted under cover at stations.

HELP FILL THE WASTE PAPER RECEPTACLE ON THESE PREMISES

Encourage others to do the same

SOUTHERN salvage helps to WIN

New Southern Railway salvage poster

Chinese Destroy Yunnan Railway.—In view of recent developments in French Indo-China and the threat of Japanese invasion of the Chinese Province of Yunnan by way of Indo-China, the Chinese military authorities have destroyed the frontier bridge, by which the Yunnan Railway crosses over from Indo-China into Yunnan, and have also dismantled 50 miles of the line from that bridge northwards.

I.A.E. Meetings.—In view of prevailing conditions, it has been decided that the opening meeting in London of the session of the Institution of Automobile Engineers shall be deferred. So far as concerns provincial meetings, arrangements have been made for a paper entitled "Bearing Metals and their Suitability for Modern Requirements," by Mr. M. Melhuish, to be presented at Coventry, Manchester, and Birmingham. Visitors may attend these meetings only if introduced by a member of the institution.

American Red Cross Help.—For the relief of suffering on the part of civilians, the American Red Cross has shipped to Great Britain since July 1 extensive supplies for distribution by the Women's Voluntary Services and other organisations. Some £14,000 have been made available immediately to purchase 12 mobile canteen units, comprising 96 vehicles. In addition, 25 station wagons now *en route* to this country are being turned over immediately upon arrival to the W.V.S. to be converted into additional mobile canteen units.

Reserved Occupation Changes.—Various changes in the schedule of reserved occupations were announced on September 19 by the Ministry of Labour & National Service. Certain occupations are added to the schedule; others are removed; and numbers of alterations have also been made in the age of reservation. Included in the list are the following occupations, not previously reserved, but now reserved at the ages stated: permanent member of railway, dock, or canal police, 18; temporary (whole-time) member of railway, dock, or canal police, 30.

Irish Traffic Returns

IRELAND		Totals for 36th Week			Totals to Date		
		1940	1939	Inc. or Dec.	1940	1939	Inc. or Dec.
		£	£	£	£	£	£
Belfast & C.D. (80 miles)	pass.	4,245	2,579	+ 1,666	120,469	98,324	+ 22,145
	goods	946	509	+ 437	20,535	15,954	+ 4,581
	total	5,191	3,088	+ 2,103	141,004	114,278	+ 26,726
Great Northern (543 miles)	pass.	18,200	14,250	+ 3,950	441,400	420,550	+ 20,850
	goods	15,500	11,300	+ 4,200	446,900	356,050	+ 80,850
	total	33,700	25,550	+ 8,150	888,300	786,600	+ 101,700
Great Southern (2,076 miles)	pass.	51,804	56,888	− 5,084	1,297,406	1,374,072	− 76,666
	goods	52,421	50,967	+ 1,454	1,638,023	1,456,373	+ 181,650
	total	104,225	107,855	− 3,630	2,935,429	2,830,445	+ 104,984
L.M.S.R. (N.C.C.) (247 miles)	pass.	6,960	4,360	+ 2,600	209,760	176,700	+ 33,060
	goods	5,730	3,250	+ 2 480	138,190	104,430	+ 33,760
	total	12,690	7,610	+ 5,080	347,950	281,130	+ 66,820

British and Irish Railway Stocks and Shares

Stocks	Highest 1939	Lowest 1939	Prices Sept. 24, 1940	Prices Rise/Fall
G.W.R.				
Cons. Ord.	38	21½	28	
5% Con. Pref. ...	92	71	73½	−1½
5% Red. Pref. (1950)	98	83	93½	—
4% Deb.	103	91	101½	−½
4½% Deb.	105½	93½	103½	—
4½% Deb.	110	99	108½	—
5% Deb.	121	109⅛	112½	—
2½% Deb.	63½	54	62	—
5% Rt. Charge ...	117	104	110½	—
5% Cons. Guar. ...	111	96⅛	103½	−1
L.M.S.R.				
Ord.	17	9½	11½	−½
4% Pref. (1923) ...	46½	20	30	−1
4% Pref.	63½	37½	43	−1½
5% Red. Pref. (1955)	83	58½	73½	—
4% Deb.	98½	85	89½	−1
5% Red. Deb. (1952)	109	101½	106	—
4% Guar.	87⅞	73	73	−1
L.N.E.R.				
5% Pref. Ord. ...	5½	3½	2½	—
Def. Ord.	3½	1½	1½	—
4% First Pref. ...	38½	19	27½	−1
4% Second Pref. ...	15	7⅛	9½	—
5% Red. Pref. (1955)	55	38	50	—
4% First Guar. ...	78½	60	63	−1
4% Second Guar. ...	68⅛	47	53½	—
3% Deb.	71⅛	57	61½	−½
4% Deb.	93	76	82	—
5% Red. Deb. (1947)	106½	98	103	—
4½% Sinking Fund Red. Deb.	104½	96	99½	—
SOUTHERN				
Pref. Ord.	78	46½	40	−1
Def. Ord.	19½	7	10	—
5% Pref.	100	76	72½	−1
5% Red. Pref. (1964)	102⅛	94	87½	—
5% Guar. Pref. ...	116½	103	105	−½
5% Red. Guar. Pref. (1957)	112½	102⅛	103½	—
4% Deb.	103	91½	94½	−4
5% Deb.	118½	109½	112½	—
4% Red. Deb. (1962-67)	106	98	101½	—
4% Red. Deb. (1970-80)	102	96	100½	—
FORTH BRIDGE				
4% Deb.	98⅛	81	87½	—
4% Guar.	95	80	85½	—
L.P.T.B.				
4½% "A"	115	103	106	−½
5% "A"	123	106½	114½	—
4½% "T.F.A." ...	105	100⅛	102	—
5% "B"	117½	102	102½	—
"C"	84	63⅞	27½	—
MERSEY				
Ord.	24½	17½	20½	—
4% Perp. Deb. ...	93⅜	88½	89½	—
3% Perp. Deb. ...	77	65½	59½	—
3% Perp. Pref. ...	55	49½	54½	—
IRELAND				
BELFAST & C.D.				
Ord.	6	3	4	—
G. NORTHERN				
Ord.	6	2½	2	—
G. SOUTHERN				
Ord.	13½	8	6	—
Pref.	26	10	19	−½
Guar.	40½	22	20	—
Deb.	57	45⅜	40	−1

OFFICIAL NOTICES

Crown Agents for the Colonies

COLONIAL GOVERNMENT APPOINTMENTS.

Applications from qualified candidates are invited for the following post :—

ASSISTANT MECHANICAL ENGINEER required by the Palestine Railways for two tours of 18 to 24 months' residential service, with possible permanency. Salary £P430 a year, rising to £P550 a year, the initial salary in the scale being fixed according to qualifications and experience. An expatriation allowance of £P50 a year and a temporary and variable cost of living allowance at present fixed at the rate of £P48 a year, are also payable (£P1 equals £1). Free passages. Candidates, age 25 to 40 must have served an apprenticeship of 5 years in mechanical workshops and be Associate Members of the Institute of Civil or Mechanical Engineers or hold an engineering degree or diploma, exempting them from passing a qualifying examination for such Memberships.

Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M 9392.

OFFICIAL ADVERTISEMENTS

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Wednesday. All advertisements should be addressed to :—*The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

Questions in Parliament

Railway Charges

Mr. W. Gallacher (West Fife—Communist), on September 18, asked the Minister of Supply, if he had made an estimate of the increased extra cost to be borne by his department on the basis of the increased rates for which the railway companies were now applying.

Mr. Herbert Morrison (Minister of Supply) : The preparation of an estimate of the kind the hon. member has in mind would require special enquiries and investigation of prices, which I do not think I should be justified in having undertaken at the present time.

Mr. Gallacher : Does not the Minister feel that it would be quite right for his Department to make such an estimate, and to join in the public opposition to the demands of the railway companies ?

Mr. Morrison : After consideration, I have taken the view that it would not be appropriate that the considerable time that would be involved should be utilised by the Ministry for this purpose.

Mr. E. Shinwell (Seaham Harbour—Lab.) : While appreciating that there would be some difficulty in making an estimate of the kind asked for, I take it that it is to be assumed that my right hon. friend is concerned about a possible increase in freights ?

Mr. Morrison : Yes, Sir, to the extent that the Ministry of Supply would be involved in the movement of transportation, but I think it would be unwise to divert the energies of my officers to the considerable labour of finding out these figures.

Troop Facilities at Manchester

Mr. Ralph Etherton (Stretford—C.), on September 19, asked the Secretary of State for War what arrangements had now been made for the comfort of troops using the L.M.S.R. London Road station at Manchester ; particularly in regard to a canteen in the station itself, near the platforms ; and how many notice spaces and of what size had now been made available at London Road station to indicate the whereabouts of the various voluntary canteens and hostels in the town for troops.

Mr. Richard Law (Financial Secretary to the War Office) : There is a Young Men's Christian Association canteen at the end of the station approach. There is also a rest room in the station, and steps are being taken to have it furnished with collapsible beds and comfortable chairs. In addition, cloakroom, washing, and lavatory accommodation is available, free of charge. Two rooms belonging to the L.N.E.R., which are adjacent to the station main entrance, are about to be adapted to canteen purposes. As regards the last part of the Question, I am informed that notices have been put up to indicate the whereabouts of the various canteens, etc., in the town, but I have no details as to the number or size.

Railway and Other Reports

Bolivia Railway Company.—Net earnings for the six months to June 30, 1940, are sufficient to pay interest of 0·787 per cent. on the 5 per cent. mortgage and collateral trust income bonds. The balance to enable interest of 1½ per cent. to be paid on the bonds has been provided by the Antofagasta Railway Company.

Maidstone & District Motor Services Limited.—An interim dividend of 5 per cent. (same) has been declared by the directors of this company, which is a subsidiary of Tilling & British Automobile Traction Limited and the Southern Railway Company jointly.

Imperial Chemical Industries Limited.—Interim dividend is again 3 per cent. less tax.

Vickers Limited.—An interim dividend of 4 per cent. (actual), less income tax, on the ordinary stock of the company in respect of the year 1940 will be paid on October 24, 1940.

Stothert & Pitt Limited.—The directors propose to pay an ordinary dividend of 10 per cent. (same) and also a cash bonus of 2½ per cent. (against 5 per cent.), both less tax, for the year to June 30, 1940.

Thos. W. Ward Limited.—The directors announce that, because of the abnormal conditions now prevailing, there is unavoidable delay in issuing their report for the year to June 30, 1940. The usual quarterly dividend on the first and second preference shares will be paid on September 30.

Hurst, Nelson & Co. Ltd.—Net profit for the year ended July 13, 1940, after taxation, was £44,108, against £59,903 for 1938-39. Final dividend is 12½ per cent., making, with the 2½ per cent. paid on May 15, reserved from the profits of the previous year, 15 per cent. for the year, against 10 per cent. for 1938-39. General reserve receives £10,000 (same). Last year reserve for A.R.P. expenditure received £3,000.

Contracts and Tenders

The Inland Steel Company of the U.S.A. has supplied 22,500 tons of rails and track accessories to the Rio Grande do Sul Railway, Brazil. The order is being partly financed by the Export & Import Bank.

The Canadian Pacific Railway has placed orders for 535 cars and frames, as a result of increased business. The Canadian Car & Foundry Company, and the National Steel Car Company, Hamilton, Ont., have been awarded contracts as follow :—

Canadian Car : 100 low-side drop-end steel gondola cars, 75-ton capacity ; 10 steel baggage and express cars, 84 ft. long ; 25 steel frames for first class passenger coaches.

National Steel Car : 100 low-side drop-end steel gondola cars ; 300 steel twin hopper coal cars, 50-ton capacity.

Interior work and finishing will be done by the Canadian Pacific Railway at the Angus shops. The 25 steel coaches will be air-conditioned.

The South African Railways & Harbours Administration is calling for tenders for the supply and delivery of disinfectant fluid (22,200 gal. in one-gal., and 15,900 gal. in 5-gal. iron drums). Tenders should reach the Chief Stores Superintendent, South African Railways, Room 3, Park Chambers, Rissik Street, or P.O. Box 8617, Johannesburg, by October 4.

The South African Railways & Harbours Administration is calling for tenders for the supply and delivery of 498 dozen Scotch screw-eyed augers of various sizes. Tenders should reach the Chief Stores Superintendent, Room 3, Park Chambers, Rissik Street, Johannesburg, or Box 8617, by October 10.

The South African Railways & Harbours Administration, Stores Department, is in the market for 350 track jacks. Tenders should reach the Chief Stores Superintendent, Room 3, Park Chambers, Rissik Street, Johannesburg, or P.O. Box 8617, by October 17.

XUM

Railway Stock Market

Under the lead of British Funds, high-class investment securities have maintained a remarkably cheerful appearance this week, and firm conditions have ruled in most other sections of the Stock Exchange. Sentiment has not been affected by the continued air raids, and there was a small increase in the volume of business, due partly to improvement in transport and postal facilities. Markets have continued to be governed more by the absence of heavy liquidation than by the small amount of business in evidence. The generous yields offered by many home railway securities have failed to attract attention, with the result that prices have declined moderately, although on balance losses do not exceed more than a point. The disposition is to await the report of the enquiry into the application for an increase in railway rates. At the moment no official indication has been given as to when this will be available, and it is apparent that the increase in rates cannot come into force as from October 1, the date originally suggested. Various debentures of the home railways have failed to respond to the firm tendency in Government securities, and are, in fact, quoted slightly lower as compared with a week ago. Nevertheless, debenture stocks remained very firmly held and are in short supply in the market.

Great Western ordinary was steady, and at 28 was unchanged on balance for the week. On the other hand, the 5 per cent. preference was a point down at 73½, while the 5 per cent. guaranteed stock has been obtainable at 105, to offer a yield of 4¾ per cent. Great Western 4 per cent. debentures were fractionally lower, and have been available to 104, yielding 3⅞ per cent. L.M.S.R. 4 per cent. senior preference was a point down at 43½, but the 1923 preference at 30½ was the same as a week ago, while the ordinary stock at 11½ was only fractionally lower. Nevertheless, the guaranteed stock reacted from 74½ to 73; the 5 per cent. debentures kept at 106, while the 4 per cent. debentures were around 90 "middle." Among L.N.E.R. issues the first and second guaranteed were each a point down at 63½ and 53½ respectively, and the first preference was 27½, compared with 28½ a week ago, while the second preference was half-a-point down at 9½. On balance, L.N.E.R. 3 per cent. and 4 per cent. debentures were fractionally lower at 61½ and 81½ respectively, but were firmly held, although the attractive yields failed to bring in many buyers.

Southern preferred was a point down at 40, although so far as can be judged, there seem reasonable grounds for expecting the full 5 per cent. dividend on this stock for the current year. Southern deferred kept around 9½, but the 5 per cent. preference was no better than 72½, and has been obtainable at 73, yielding 6⅞ per cent. Southern 4 per cent. debentures have been obtainable at 97 to yield 4⅛ per cent. London Transport "C" was 27½, and the 4½ per cent. "A" stock 106.

Argentine railway securities, developed a moderately reactionary tendency following their recent rally, it being realised that it should be possible to assess the position and outlook much better when results for the past financial year are known, and the statements at the annual meetings are available. B.A.Gt. Southern 4 per cent. debentures, however, were a point higher at 45. Central Argentine 4 per cent. and 5 per cent. debentures both remained around 31; there was some uncertainty in the market whether the next interest payments will be met in full. In other directions a fair amount of activity was shown in Canadian Pacific preference stock, which, however, was slightly lower at 45.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1939-40	Week Ending	Traffic for Week: Total this year	Traffic for Week: Inc. or Dec. compared with 1939	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1939	Prices: Lowest 1939	Prices: Sept. 24, 1940	Yield %* (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	15.9.40	17,250	+ 1,040	37	637,860	490,160	+ 147,700	Ord. Stk.	10⅜	4½	5¼	Nil
	Argentine North Eastern ..	753	14.9.40	ps. 176,400	— ps. 4,600	11	ps. 1,934,500	ps. 2,018,100	— ps. 83,600	,,	4½	2	2	Nil
	Bolivar	174	Aug. 1940	3,550	— 1,350	35	32,180	34,050	— 1,870	6 p.c. Deb.	7½	5⅜	6½	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	5⅜	4¼	6*	Nil
	Buenos Ayres & Pacific ...	2,801	7.9.40	ps.1,089,000	—ps.114,000	10	ps.11,110,000	ps. 12,472,000	—ps.1,362,000	Ord. Stk.	5½	2	2	Nil
	Buenos Aires Central ...	190	27.7.40	$94,400	— $40,000	4	$352,600	$409,600	— $57,000	—	—	—	—	—
	Buenos Ayres Gt. Southern	5,082	7.9.40	ps.1,724,000	+ ps.47,000	10	ps.19,138,000	ps. 19,186,000	—ps. 48,000	Ord. Stk.	13⅜	4½	4¼	Nil
	Buenos Ayres Western ...	1,930	7.9.40	ps. 562,000	—ps.106,000	10	ps. 6,122,000	ps 6,746,000	—ps. 624,000	,,	10½	4	4	Nil
	Central Argentine	3,700	14.9.40	ps.1,339,650	—ps 549,600	11	ps.15,617,800	ps. 22,877,100	—ps7,259,300	,,	11¼	4	4	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	4	1½	2	Nil
	Cent. Uruguay of M. Video ...	972	7.9.40	16,602	216	10	173,898	167,018	+ 6,880	Ord. Stk.	2½	7/8	1½	Nil
	Costa Rica	188	May 1940	17,282	— 7,020	48	193,339	245,516	— 52,177	Stk.	24½	18	17½	11⅜
	Dorada	70	Aug. 1940	13,330	— 900	35	98,500	109,300	— 10,800	1 Mt. Db.	104½	102	98	6 7/16
	Entre Rios	810	14.9.40	ps. 234,800	— ps. 35,500	11	ps. 2,632,200	ps. 3,084,700	—ps 452,500	Ord. Stk.	6	3	1½	Nil
	Great Western of Brazil ...	1,016	31.8.40	8,000	+ 300	35	344,900	278,400	+ 66,500	Ord. Sh.	3/-	1/2½	7/8	Nil
	International of Cl. Amer. ...	794	July 1940	$419,682	— $43,933	30	$3,724,774	$3,697,627	+ $27,147	—	—	—	—	—
	Interoceanic of Mexico ...	—	—	—	—	—	—	—	—	1st Pref.	7½d.	7½d.	½	Nil
	La Guaira & Caracas	22¾	Aug. 1940	6,445	— 990	35	52,060	49,355	+ 2,705	—	—	—	—	—
	Leopoldina	1,918	7.9.40	22,650	+ 612	36	803,233	717,093	+ 86,140	Ord. Stk.	2½	½	1	Nil
	Mexican	483	7.8.40	ps. 239,400	ps. 800	5	ps. 1,504,800	ps. 1,522,400	—ps. 17,600	,,	1⅜	½	½	Nil
	Midland of Uruguay	319	July 1940	10,223	+ 1,081	4	10,223	9,142	+ 1,081	—	—	—	—	—
	Nitrate	386	15.9.40	8,116	+ 4,217	37	128,115	84,001	+ 44,114	Ord. Sh.	2½	1½	1⅜	7 1/11
	Paraguay Central	274	14.9.40	$2,798,000	— $208,000	11	$38,803,000	$38,483,000	+ $320,000	Pr. Lt. Stk.	45½	36	38	15⅛
	Peruvian Corporation ...	1,059	Aug. 1940	69,178	+ 7,745	9	134,599	125,839	+ 8,760	Pref.	1 7/16	7/8	1½	Nil
	Salvador	100	3.8.40	£8,584	£5,416	5	£54,545	£58,932	— £4,387	—	—	—	—	—
	San Paulo	153½	8.9.40	30,625	+ 8,695	36	1,334,691	1,167,862	+ 166,829	Ord. Stk.	38	20	31½	7 1/16
	Taltal	160	July 1940	2,085	+ 530	4	2,085	1,555	+ 530	Ord. Sh.	⅜	6/6	½	9⅛
	United of Havana	1,353	14.9.40	15,076	— 6,627	11	173,614	194,726	— 21,112	Ord. Stk.	2	½	½	Nil
	Uruguay Northern	73	July 1940	930	+ 106	4	930	824	+ 106	—	—	—	—	—
Canada	Canadian National	23,695	14.9.40	977,726	— 83,944	37	33,376,316	25,814,899	+ 7,561,417	—	—	—	—	—
	Canadian Northern ...	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	74⅜	60	74	5⅜
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	100½	76	102	3 1/16
	Canadian Pacific	17,153	14.9.40	697,000	— 267,600	37	22,643,200	18,990,200	+ 3,653,000	Ord. Stk.	7⅜	3½	5½*	Nil
India †	Assam Bengal	1,329	30.4.40	45,187	+ 6,529	4	135,060	120,437	+ 14,623	Ord. Stk.	76½	60	72½	4⅛
	Barsi Light	202	30.6.40	2,550	— 5,790	13	33,127	33,937	— 810	—	—	—	—	—
	Bengal & North Western ...	2,091	Aug. 1940	204,825	+ 34,908	22	1,251,276	1,076,424	+ 174,852	Ord. Stk.	277	229½	240	6 1/16
	Bengal Dooars & Extension ...	161	30.6.40	4,607	+ 591	13	35,833	26,600	+ 9,233	,,	91	84½	215	3
	Bengal-Nagpur	3,269	20.7.40	219,450	+ 31,965	16	2,610,743	2,443,807	+ 166,936	,,	94¾	83½	91	4⅜
	Bombay, Baroda & Cl. India	2,986	10.9.40	237,600	+ 25,200	23	4,195,575	3,717,225	+ 478,350	,,	108	90	104	5¼
	Madras & Southern Mahratta	2,967	20.7.40	140,250	— 8,831	16	1,921,789	1,902,694	+ 19,095	,,	104 1/16	92	93½	7½
	Rohilkund & Kumaon ...	571	Aug. 1940	40,125	+ 5,832	22	282,833	224,369	+ 58,464	,,	280	263	250	6⅜
	South Indian	2,542	20.7.40	121,599	+ 10,755	16	1,390,463	1,294,081	+ 96,382	,,	102½	88	84½	5 1/16
Various	Beira	204	July 1940	83,043	—	43	747,446	—	—	—	—	—	—	—
	Egyptian Delta	623	10.5.40	4,591	— 602	6	19,436	20,384	— 948	Prf. Sh.	½	¼	½	Nil
	Kenya & Uganda	1,625	—	—	—	—	—	—	—	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	55	39	47½	7⅛
	Midland of W. Australia ...	277	June 1940	10,926	— 618	52	156,230	177,307	— 21,077	Inc. Deb.	91½	87½	82½	4⅛
	Nigerian	1,900	27.7.40	29,016	+ 2,233	18	631,889	480,613	— 151,276	—	—	—	—	—
	Rhodesia	2,442	July 1940	442,978	—	43	3,916,232	—	—	—	—	—	—	—
	South Africa	13,287	17.8.40	716,804	+ 57,864	20	13,367,547	12,766,409	+ 601,138	—	—	—	—	—
	Victoria	4,774	June 1940	797,185	+ 103,739	52	9,912,449	9,360,329	+ 582,120	—	—	—	—	—

Note. Yields are based on the approximate current prices and are within a fraction of ⅛. Argentine traffics are now given in pesos
* Quotation is of June 17, 1940; dealings subsequently prohibited † Receipts are calculated @ 1s. 6d. to the rupee